No. 2015-1180

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

AMDOCS (ISRAEL) LIMITED,

Plaintiff-Appellant,

v.

OPENET TELECOM, INC., OPENET TELECOM LTD.,

Defendants-Appellees.

On Appeal from the United States District Court for the Eastern District of Virginia in Case No. 1:10-cv-00910, Judge Leonie M. Brinkema.

CORRECTED JOINT APPENDIX (A1-A1789)

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May 6, 2015

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IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA

Alexandria Division

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff,	)))))
v.	) Civil Action No. 1:10cv910 (LMB/TRJ)
OPENET TELECOM, INC., a Delaware Corporation, et al., Defendants.	))))))

JUDGMENT

Pursuant to the order of this Court entered on October 24, 2014 and in accordance with Fed. R. Civ. P. 58, JUDGMENT is hereby entered in favor of the defendants Openet Telecom, Inc., a Delaware Corporation, et al.

FERNANDO GALINDO, CLERK

By:________/s/_________________
Y. Guyton, Deputy Clerk

Dated: 10/24/2014
Alexandria, Virginia

IN THE UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF VIRGINIA
Alexandria Division

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff, v. OPENET TELECOM, INC., a Delaware Corporation, et al., Defendants.	)	1:10cv910 (LMB/TRJ)

ORDER

For the reasons stated in the accompanying Memorandum Opinion, Defendants' Motion for Judgment on the Pleadings [Dkt. No. 293] is GRANTED, and it is hereby

ORDERED that judgment be and is entered in favor of the defendants.

The Clerk is directed to enter judgment in defendants' favor pursuant to Fed. R. Civ. P. 58 and forward copies of this Order and the accompanying Memorandum Opinion to counsel of record.

Entered this 24th day of October, 2014.

Alexandria, Virginia

/s/ LMB
Leonie M. Brinkema
United States District Judge

IN THE UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF VIRGINIA
Alexandria Division

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff,	)	
v.	)	1:10cv910 (LMB/TRJ)
OPENET TELECOM, INC., a Delaware Corporation, et al., Defendants.	)	

MEMORANDUM OPINION

Before the Court is Defendants' Motion for Judgment on the Pleadings [Dkt. No. 293]. Having considered the pleadings as well as the oral argument of counsel, the motion will be granted for the reasons discussed below.

I. BACKGROUND

Amdocs (Israel) Limited ("plaintiff" or "Amdocs") and Openet Telecom LTD and Openet Telecom, Inc. (collectively, "Openet") compete to provide software which allows telecommunications providers to track customer usage of computer network services. On August 16, 2010 Amdocs filed this patent infringement action alleging that Openet infringed U.S. Patent Nos. 6,836,797 ("the '797 Patent") and 7,631,065 ("the '065 Patent."). Complaint [Dkt. No. 1]. Amdocs added U.S. Patent Nos. 7,412,510 ("the '510 Patent") and 6,947,984 ("the '984 Patent")

via an Amended Complaint on February 3, 2011. [Dkt. No. 50]. Openet responded with an Answer and Counterclaim, alleging invalidity and non-infringement and filed a Motion for Summary Judgment of Non-Infringement and Invalidity on May 26, 2011. The motion was granted as to non-infringement by a memorandum opinion on January 22, 2013. [Dkt. No. 259]. Amdocs appealed. [Dkt. No. 264]. The Federal Circuit affirmed two term constructions but reversed a third, and accordingly vacated the grant of summary judgment of non-infringement. Amdocs (Israel) Ltd. v. Openet Telecom, Inc., 761 F.3d 1329 (Fed. Cir. 2014). While the case was on appeal, the Supreme Court decided Alice Corp. Pty. Ltd. v. CLS Bank Int'l, which invalidated a computer software patent under 35 U.S.C. § 101 for being directed to an abstract idea. 134 S.Ct. 2347 (2014).

Upon remand, Openet filed the pending Motion for Judgment on the Pleadings, in which it argues that all of the asserted claims are invalid under 35 U.S.C. § 101 as being directed to unpatentable abstract ideas. Defendants' Memorandum In Support Of Their Motion For Judgment On The Pleadings [Dkt. No. 294] ("Openet's Br."). Amdocs has filed an opposition, Plaintiff's Opposition To Defendants' Motion For Judgment On The Pleadings [Dkt. No. 297] ("Opp'n"), and Openet has replied. Openet's Reply

In Support Of Their Motion For Judgment On The Pleadings [Dkt. No. 298] ("Reply").

II. DISCUSSION

A. Standard of Review

"Section 101 patent eligibility is a question of law." In re Roslin Institute (Edinburgh), 750 F.3d 1333, 1335 (Fed. Cir. 2014). Accordingly, a court may invalidate patent claims directed to non-eligible subject matter on the pleadings. See buySAFE, Inc. v. Google, Inc., 765 F.3d 1350 (Fed. Cir. 2014).

In a motion for judgment on the pleadings, the court should "assume all facts alleged in the complaint are true and draw all reasonable factual influences in [the plaintiff]'s favor." Burbach Broadcasting Co. of Del. v. Elkins Radio Corp, 278 F.3d 401, 406 (4th Cir. 2002). "Judgment should be entered when the pleadings, construing the facts in the light most favorable to the non-moving party, fail to state any cognizable claim for relief, and the matter can, therefore, be decided as a matter of law." O'Ryan v. Dehler Mfg. Co., 99 F. Supp. 2d 714, 718 (E.D. Va. 2000).

B. Patentability after Alice

To be eligible for a patent, a claimed invention must be directed to "any new and useful process, machine, manufacture, or composition of matter." 35 U.S.C. § 101 (2012). "In choosing such expansive terms . . . modified by the comprehensive 'any,'

Congress plainly contemplated that the patent laws would be given wide scope," Diamond v. Chakrabarty, 447 U.S. 303, 308 (1980); however, "for more than 150 years" the Supreme Court has "held that [§ 101] contains an important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable." Alice Corp. Pty. Ltd. v. CLS Bank Intern., 134 S.Ct. 2347, 2354 (2014)(quoting Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 133 S.Ct. 2107, 2116 (2013)). Accordingly, "a new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. Likewise, Einstein could not patent his celebrated law that $E=mc^2$; nor could Newton have patented the law of gravity." Chakrabarty, 447 U.S. at 309.

Although those examples match the Supreme Court's old description of the exceptions as "a fundamental truth; an original cause; [or] a motive," LeRoy v. Tatham, 55 U.S. 156, 175 (1852), claims which are not so purely abstract have also been invalidated under § 101. For example, in Bilski v. Kappos the Court found a claim directed to "the basic concept of hedging, or protecting against risk" to be unpatentable. 130 S. Ct. 3218, 3231 (2010). In Bilski, the Court looked past the text of the claims to the underlying concept, and viewing the claimed invention as manifesting no more than an abstract idea declared

the claims patent ineligible. Id. This conforms with the Supreme Court's warning "against interpreting patent statutes in ways that make patent eligibility depend simply on the draftsman's art." Mayo Collab. Servs. v. Prometheus Labs. Inc., 132 S.Ct. 1289, 1294 (2012)(internal quotation marks omitted).

Decided on June 19, 2014,[1] Alice articulated a two-step process for determining whether a claim was directed to patent-eligible subject matter. 134 S.Ct. at 2355. "First, [a court must] determine whether the claims at issue are directed to [a] patent-ineligible concept[]." Id. "If so, [the court must] then ask, 'what else is there in the claims before us?'" Id. (internal quotation marks omitted). "To answer that question, [the court must] consider the elements of each claim . . . to determine whether the additional elements transform the nature of the claim into a patent-eligible application." Id. (internal quotation marks omitted).

At step one, a court must evaluate the claims "[o]n their face" to determine to which "concept" the claims are "drawn." Id. at 2356 ("On their face, the claims before us are drawn to the concept of intermediated settlement."); Bilski, 130 S.Ct. at 3229 (finding claims drawn to "both the concept of hedging risk

[1] After the grant of summary judgment, and while this case was on appeal to the Federal Circuit.

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and the application of that concept to energy markets" to be patent ineligible).

At step two, a court "search[es] for an inventive concept - i.e., an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the ineligible concept itself." Alice, 134 S.Ct. at 2355 (internal quotation marks omitted). In Alice, the Court concluded that the claimed invention was directed to an abstract idea implemented on a generic computer, and that computer implementation was not "sufficient to transform the claimed abstract idea into a patent-eligible application." Id. at 2357 (internal quotation marks omitted). For an abstract idea involving a computer to be patent-eligible, "the claim ha[s] to supply a 'new and useful' application of the idea." Id. (quoting Gottschalk v. Benson, 409 U.S. 63, 67 (1972)). Accordingly, "the mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent eligible invention." Id. at 2358. At step two, the Supreme Court looked at the invention as described by the claims, rather than the further detail given in the specification. See id. at 2359.

This framework requires considering what constitutes an abstract idea and what can raise an abstract idea to the level of a patent-eligible application. The Supreme Court explicitly

refused to "delimit the precise contours of the 'abstract ideas' category." Id. at 2357. Although the Court was clear that "appending conventional steps, specified at a high level of generality" or reciting the use of a generic computer was not sufficient to make an idea patent eligible, id., neither did the Court elucidate any necessary elements for eligibility. See id. at 2358. The Court described Diamond v. Diehr, 450 U.S. 175 (1981) as succeeding at step two because the claim "improved an existing technological process," id., and implied that if the claims "improve[d] the function of the computer itself" then they would be patentable. Id. at 2359. Indeed, one district judge observed that since Alice, the "two step test" is more like Justice Stewart's statement about obscenity: "I shall not today attempt further to define the kinds of material I understand to be embraced within that shorthand description, and perhaps I could never succeed in intelligibly doing so. But I know it when I see it." McRO, Inc. v. Activision Pub., Inc., No. CV 14-336-GW, 2014 WL 4759953, at *5 (C.D. Cal. Sept. 22, 2104) (quoting Jacobellis v. State of Ohio, 378 U.S. 184, 197 (1964)(Stewart, J., concurring)).

Application of the two-part test can be guided by the rationale underlying the doctrine that abstract ideas are not patentable. The § 101 exceptions prevent a patentee from

preempting further research, which the Court has explained as a concern because "[l]aws of nature, natural phenomena, and abstract ideas are the basic tools of scientific and technological work . . . Monopolization of those tools through the grant of a patent might tend to impede innovation more than it would tend to promote it, thereby thwarting the primary object of the patent laws." Alice, 134 S.Ct. at 2354 (internal quotation marks omitted).

The preemption concern must also be considered in light of the field to which the patent is directed. If the claimed abstract idea "has no substantial practical application except in connection" with the particular field claimed, then allowing a claim to that idea, even if limited to a particular field, "would wholly pre-empt" the idea and "in practical effect would be a patent on the [idea] itself." Gottschalk v. Benson, 409 U.S. 63, 71-72 (1972). In other words, even if an idea is only useful in one particular field, "limiting" a patent claim to that particular field is not enough to transform the idea into something patent-eligible because the idea would only work in that field anyway. In Gottschalk, for example, the claim was to a method, in a digital computer, of converting a decimal representation of a number to a binary representation. Id. at 65-66. Because that formula "has no substantial practical

application except in connection with a digital computer, [allowing the claim] would wholly preempt the mathematical formula and in practical effect would be a patent on the algorithm itself." Id. at 71-72.

Courts must balance concerns about preemption with the reality that, at some level, all inventions use abstract ideas, laws of nature, and natural phenomena. Alice, 134 S.Ct. at 2354. That a claim involves an abstract concept is not enough to render the claim invalid; the claim must also preempt research or invention. The preempted area does not need to be broad. "[T]he underlying functional concern is a relative one: how much future innovation is foreclosed relative to the contribution of the inventor. A patent upon a narrow law of nature may not inhibit future research as seriously as would a patent upon Einstein's law of relativity, but the creative value of the discovery is also considerably smaller." Mayo Collab. Servs. v. Prometheus Labs. Inc., 132 S.Ct. 1289, 1303 (2012) (citation omitted). Accordingly, in applying the § 101 exceptions, a court must distinguish patents that claim only ideas from those which claim ideas as part of something more. Alice, 132 S.Ct. at 2354; Digitech Image Techs., LLC v. Electronics for Imaging, Inc., 758 F.3d 1344, 1350 (Fed. Cir. 2014) ("A claim may be eligible if it

includes additional inventive features such that the claim scope does not solely capture the abstract idea.").

A claim directed to "a method of organizing human activity" seems presumptively patent ineligible. Alice, 134 S.Ct. at 2356. In Alice, the Court rejected the assertion that abstract ideas must be "preexisting, fundamental truth[s]," because the claims in Bilski were directed to a method of organizing human activity. Id. In Alice, however, the Court invalidated a claim "drawn to the concept of intermediated settlement," and did not state that the claim was merely a method of organizing human activity. Id. Relying on the characterization of Bilski in Alice, courts have invalidated patent claims which merely organized human activity. See, e.g., Planet Bingo, LLC v. VKGS LLC, No. 2013-1663, 2014 WL 4195188, at *2 (Fed. Cir. Aug. 26, 2014) (invalidating as an abstract idea a patent claim to "managing a bingo game.").

C. Procedural Bar

At the onset, Amdocs argues that this Court should deny defendants' motion because it is procedurally barred and contrary to the "law of the case." Opp'n at 7-10. In particular, Amdocs argues that Openet already presented summary judgment argument on the § 101 issue, but lost the motion after the Court found that there were genuine issues of material fact precluding summary judgment of invalidity. Id. at 10. Openet responds that

the Court may consider validity because the Court never concluded that Amdocs's patents were drawn to eligible subject matter. Moreover, a court may revisit an interlocutory ruling (such as denial of summary judgment) at any time, and, in any event, Alice represents a change in substantive law as applied to this case. Reply at 11-13.

Openet has the better of this argument. Whether Amdocs's patents were drawn to eligible subject matter was not resolved by the Court, and even if the issue had been addressed Alice represents a change, or a significant clarification, of the law: "Alice . . . categorically establish[ed] a clear rule that had been previously subject to debate: 'mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention.'" Eclipse IP LLC v. McKinley Equipment Corp., No. SACV 14-742-GW, 2014 WL 4407592, at *3 (C.D. Cal. Sept. 4, 2014).[2] Accordingly, there is no bar to reaching the merits of Openet's motion.

D. Analysis Under § 101

1. '065 Patent

Amdocs alleges infringement of claims 1, 4, 7, 13, and 17 of the '065 Patent. Opp'n at 15. Claims 1, 7, and 13 are

[2] Further, the Supreme Court decided Mayo - the main case on which Alice relies - on March 20, 2012, which was after completion of summary judgment briefing. Amdocs filed the last brief regarding summary judgment on June 30, 2011, [Dkt. No. 166], and the last hearing regarding summary judgment was on July 25, 2011. See Transcript of July 25, 2011 Proceedings [Dkt. No. 240].

independent, claiming a computer program product, a method, and a system, respectively. See '065 Patent Col. 16. Claim 1 is representative:

> 1. A computer program product embodied on a computer readable storage medium for processing network account information comprising:
>
> computer code for receiving from a first source a first network accounting record;
>
> computer code for correlating the first network accounting record with accounting information available from a second source; and
>
> computer code for using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.

Both Amdocs and Openet only present arguments regarding claim 1; this accords with Alice, Mayo, and Bilski, in which the Supreme Court found that various claim types (method, system, etc.) directed to the same invention should rise and fall together. See Alice, 134 S.Ct. at 2360 (invalidating under § 101 system claims that were "no different from the method claims in substance.").

Openet argues that claim 1 of the '065 Patent is directed to the abstract idea of "correlating and enhancing network usage data," which is ineligible subject matter because it merely creates and merges two data sets, similar to the claim at issue in Alice. Openet's Br. at 7-8. Openet further argues that the claim is similar to the claims invalidated by the Federal Circuit in Digitech Image Techs., LLC v. Electronics for

Imaging, Inc. Id. at 8 (citing Digitech, 758 F.3d 1344, 1350 (Fed. Cir. 2014)). Finally, Openet argues that the elements recited by claim 1 of the '065 Patent are merely conventional, and do not improve the functioning of the computer or effect an improvement in any technology or field. Openet's Br. at 9. Amdocs responds that the claim does not recite a fundamental economic practice or method of organizing human activity, and so is not similar to the claims found ineligible in Bilski and invalidated in Alice. Opp'n at 15. Further, Amdocs argues that the claim "is directed to a specific improvement to packet-based network billing technology" and therefore, to the extent that the claims recite an abstract idea, they recite sufficiently "more" to make the claim patent-eligible. Id. at 16.

To determine whether the claim is patent eligible, the Court employs the two-step analysis articulated in Alice. Step one requires determining whether the claim is directed to an abstract idea. On its face and looking past the mere claim language, claim 1 focuses on the concept of correlating two network accounting records to enhance the first record. As the claim satisfies step one by being drawn to an abstract idea, the court must turn to step two to determine whether the claim adds enough to the abstract idea to make the claim patent eligible. Here, claim 1 does not add to the idea of correlating two

network accounting records. Indeed, it is difficult to conceive of broader terms with which the idea of correlating two records could be described. Claim 1 does not limit the correlation to any specific hardware, nor give any detail regarding how the records are "correlated" or "enhanced." Accordingly, the claim amounts to "nothing significantly more than an instruction to apply the abstract idea" of correlating two network accounting records "using some unspecified, generic" computer hardware. See Alice, 134 S.Ct. at 2360 (internal quotation marks omitted). Accordingly, claim 1 is invalid under 35 U.S.C. § 101.

This conclusion is buttressed by decisions from other courts which have held similar claims invalid. For example, the claim invalidated in Alice involved correlating a shadow credit record and a shadow debit record, and provided much more detail than does claim 1 of the '065 Patent. Id. at 2352 n.2. Similarly, the claim at issue in Digitech involved generating a device profile (i.e., an enhanced record) from two other sets of data. 758 F.3d at 1350-51. In that case, the Federal Circuit found that "[w]ithout additional limitations, a process that employs mathematical algorithms to manipulate existing information to generate additional information is not patent eligible." Id. at 1351. In Alice, the Supreme Court found that "electronic recordkeeping" was "one of the most basic functions

of a computer" and, therefore, the claim was directed to an abstract idea because the claim simply required a "generic computer to perform generic computer functions." 134 S.Ct. at 2359.

Claim 1 also implicates the preemption concerns that the Supreme Court indicated animate the § 101 eligibility exceptions. Because claim 1 "has no substantial practical application except in connection" with computer networks, finding claim 1 patent-eligible "would wholly preempt" essentially all research or development involving correlation of two accounting records over a network, and therefore "in practical effect would be a patent on the [idea] itself." See Gottschalk v. Benson, 409 U.S. 63, 71-72 (1972). Claim 1 does not "integrate the [abstract idea] into something more," and therefore is not patent eligible. Alice, 134 S.Ct. at 2355.

Amdocs's arguments that the claim is patent eligible fail. First, Amdocs argues that that the claim is not directed to a fundamental economic practice, as in Bilski, or a method of organizing human activity, as in Alice. Opp'n at 15. Accordingly, Amdocs argues that because the claim is "far from a 'fundamental truth,'" it is patent eligible. Id. In Alice, however, the Supreme Court specifically found that abstract

ideas were not limited to "preexisting, fundamental truth[s]." Alice, 134 S.Ct. at 2356.

Amdocs also argues that all asserted claims are patentable because the claims could not be performed by a human being alone. Opp'n at 12 (citing Helios Software, LLC v. SpectorSoft Corp., No. 12-081-LPS, 2014 WL 4796111, at *17 (D. Del. Sept. 18, 2014)). Alice focuses the inquiry, however, on whether the claim is directed to an abstract idea, not on whether the claim could be performed by a human. See Alice, 134 S.Ct. at 2359-60. Although performance by a human may be sufficient to find that an idea is abstract, it is not necessary. See id.; Digitech, 758 F.3d at 1351. Accordingly, Amdocs's argument fails.

Amdocs also argues that, despite the spate of patents invalidated under 35 U.S.C. § 101 post-Alice, "no court has invalidated patent claims . . . . directed to specific technology similar to the claims of the asserted patents." Opp'n at 11. That argument also fails. Courts have not only invalidated patents for business methods or methods of organizing human activity since Alice, but in McRO, Inc. v. Activision Pub., Inc. Judge Wu invalidated a patent to a novel method for animating lip synchronization and facial expressions of three-dimensional characters, even though he recognized that the patentee invented an innovative process. No. CV 14-336-GW, 2014 WL 4759953, at *11

(C.D. Cal. Sept. 22, 2014). The Supreme Court spoke broadly in Alice, and did not restrict its holding to any particular field or fields.

Finally, Amdocs presents a number of arguments regarding unclaimed aspects of how the invention operates. For example, Amdocs quotes this Court's previous memorandum opinion, which stated that "[t]he patented system collects . . . raw usage data records from their diffuse locations throughout the network and through appropriate filtering, aggregation, correlation, and enhancement transforms them into a format suitable for accounting." Opp'n at 15-16 (quoting January 22, 2013 Memorandum Opinion [Dkt. No. 259] at 6). As those features are unclaimed, they cannot affect patent eligibility.

Accordingly, claim 1 of the '065 patent, as well as claims 7 and 13, are directed to ineligible subject matter and are therefore invalid. Dependent claim 4 only adds that "the accounting information is in the form of a second network accounting record," and dependent claim 17 only adds that the system further includes "a module coupled to the plurality of data collectors, the module receives the records produced by the plurality of data collectors for aggregation purposes, and wherein the enhancement component resides in the module." Because the claims do not add sufficiently "more" to render them

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patent eligible, and Amdocs does not argue that they do, see Opp'n at 15-16 and 22-24, these claims are also invalid.

2. '510 Patent

Amdocs alleges infringement of claims 16, 17, and 19 of the '510 Patent. Opp'n at 15. Claims 16 is independent, claiming a computer program product. See '510 Patent Col. 17. Claim 16 provides:

> 16. A computer program product stored in a computer readable medium for reporting on a collection of network usage information from a plurality of network devices, comprising:
>
> computer code for collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers;[3]
>
> computer code for filtering and aggregating the network communications usage information;
>
> computer code for completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;
>
> computer code for storing the plurality of data records in a database;
>
> computer code for submitting queries to the database utilizing predetermined reports for retrieving information on the collection of the network usage information from the network devices; and
>
> computer code for outputting a report based on the queries;
>
> wherein resource consumption queries are submitted to the database utilizing the reports for retrieving information on resource consumption in a network; and
>
> wherein a resource consumption report is outputted based on the resource consumption queries.

[3] Information sent from one computer to another computer through a network must pass through one or more layers, depending on the source of the information. See, e.g., Internetworking Technologies Handbook, Cisco Systems, Inc. (4th ed. 2004) at 10-16. "Each layer in the source system adds control information to data, and each layer in the destination system analyzes and removes control information from that data." Id. at 13.

Openet argues that claim 16 of the '510 Patent is directed to "[t]he abstract idea of . . . creation of a database of network usage information that can be queried to retrieve information on the collection of network usage information. Reports can be generated based on the queries and alerts can be set." Openet's Br. at 11. Openet argues that because the prior art included the use of batch processing, the computer implementation does not provide the inventive concept necessary at step two. Id. Further, Openet argues that the claim is drawn to a method of organizing human activity, as it could be performed by a human being with a file cabinet. See id. at 12. Amdocs responds that because the data is collected and processed by a physical device, the claims cover enhancements of network accounting records in a packet-based network, and the enhancement must occur close to the source of the usage information, the tasks cannot be performed by a human and therefore the claim is patent eligible. Opp'n at 19.

Claim 16 of the '510 Patent is not as manifestly broad as claim 1 of the '065 Patent. Accordingly, at step one of the Alice analysis, the concept at issue must be framed carefully, mindful of preemption while recognizing that at some level all patent claims involve an abstract idea or other building block of human knowledge. Alice, 134 S.Ct. at 2354. Claim 16 of the

'510 Patent meets step one by being directed to the abstract idea of using a database to compile and report on network usage information. Therefore, step two analysis is appropriate to determine whether the claim adds enough to be patent eligible. Here, as with claim 1 of the '065 Patent, the claim does not add much to the idea of using a database to compile and report on network usage. In claim 16, a generic computer collects, filters, aggregates, and completes network communications information. '510 Patent Col. 17. The generic computer then stores the information in a database, and queries the database to retrieve reports. Collecting, filtering, aggregating, and completing network information amounts to "electronic recordkeeping," which is "one of the most basic functions of a computer." Alice, 134 S.Ct. at 2359. Similarly, storing and querying information in a database, and building reports based on that information, is one of the most basic functions of a database system. Accordingly, claim 16 is directed to a computer functioning in a conventional way, and a database functioning in a conventional way. The claim does not add any specific implementation beyond the abstract idea that information is collected and stored, and reports are generated. Therefore, the claim is directed to an unpatentable abstract idea.

Because asserted dependent claims 17 and 19 do not "transform" claim 16 to a patent-eligible application of an abstract idea (nor does Amdocs argue that they do, see Opp'n at 16-19), those claims are invalid for the same reason.

3. '797 Patent

Amdocs alleges infringement of claims 1, 2, 7, 8, and 19 of the '797 Patent. Claims 1, 7, and 19 are independent, and claim 1 is representative:

> 1. A method for generating a single record reflecting multiple services for accounting purposes, comprising:
> (a) identifying a plurality of services carried out over a network;
> (b) collecting data describing the plurality of services; and
> (c) generating a single record including the collected data, wherein the single record represents each of the plurality of services;
> wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;
> wherein the data is collected utilizing an enhancement procedure defined utilizing a graphical user interface by:
> listing a plurality of available functions to be applied in real-time prior to end-user reporting;
> allowing a user to choose at least one of a plurality of fields, and
> allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to end-user reporting.

Openet argues that the claims of the '797 Patent are directed to the abstract idea of "creation of a single record for accounting

purposes from information collected from two of the specified services." Openet's Br. at 19. Amdocs repeats its argument that the claims are not directed to a "fundamental truth." Opp'n at 20. Amdocs also argues that the '797 Patent specifically states how data is collected - namely, "utilizing an enhancement procedure defined utilizing a graphical user interface." Id. at 27.

Under step one of the Alice analysis, the abstract idea in this claim is to generate a single record reflecting multiple services. At step two, the claim does not appear to add more than conventional computer functions operating in a conventional manner. For example, a generic computer identifies services, collects data, and generates a single record. Again, this amounts to "electronic recordkeeping . . . one of the most basic functions of a computer." Alice, 134 S.Ct. at 2359. The data is collected using an enhancement procedure via a graphical user interface (GUI), which is the conventional method for a user to interact with a computer and computer data. The listed "services" are merely the conventional methods of computer network communication. Accordingly, the claim is directed to an abstract idea performed using purely conventional computer operations, and is, therefore, invalid under § 101.

As they are directed to essentially the same invention, claims 7 and 19 are also directed to ineligible subject matter. Dependent claims 2 and 8 do not add sufficiently "more" to render them patent eligible, and Amdocs does not argue that they do. See Opp'n at 26-27. Therefore, the asserted claims of the '797 Patent are also invalid.

4. '984 Patent

Amdocs alleges infringement of claim 1, 2, 7, 8, and 13. Claims 1 and 13 are independent, and claim 1 is representative:

> 1. A method for reporting on the collection of network usage information from a plurality of network devices, comprising:
>
> (a) collecting networks communications usage information in real-time from a plurality of network devices at a plurality of layers utilizing multiple gatherers each including a plurality of information source modules each interfacing with one of the network devices and capable of communicating using a protocol specific to the network device coupled thereto, the network devices selected from the group consisting of routers, switches, firewalls, authentication servers, web hosts, proxy servers, netflow servers, databases, mail servers, RADIUS servers, and domain name servers, the gatherers being positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network;
>
> (b) filtering and aggregating the network communications usage information;
>
> (c) completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;
>
> (d) storing the plurality of data records in a database;
>
> (e) allowing the selection of one of a plurality of reports for reporting purposes;
>
> (f) submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices; and
>
> (g) outputting a report based on the queries.

Openet argues that the claims of the '984 Patent are directed to the abstract idea of "the creation of a 'queryable' database of network usage information." Openet's Br. at 14. Openet argues that the claims of the '984 Patent "add nothing more than generic and conventional computer hardware," and that "[t]he claim recites a litany of well-known 'network devices,' none of which is performing anything other than its typical and ordinary function." Id. Openet also argues that the claims could be performed by a human being. Id. Amdocs groups the '984 Patent with the '510 Patent, responding that the claim involves sufficiently more than the abstract idea itself, particularly adding information source modules and that the network devices communicate with specific protocols. Opp'n at 25.

In light of Amdocs's grouping of the asserted claims of the '984 Patent with the asserted claims of the '510 Patent, see Opp'n at 16-19 and 24-26, and admission at oral argument that such grouping is appropriate, Transcript of Oct. 24, 2014 Oral Argument [Dkt. No. 300] at 5-6, the asserted claims of the '984 Patent are invalid for the reasons supporting invalidity of the '510 Patent.

Even taken separately, the claims of the '984 Patent are invalid as directed to abstract ideas. Starting again at step

one of Alice, the abstract idea at issue in this claim is reporting on the collection of network usage information from a plurality of network devices. At step two, the Court must determine whether the claims add sufficiently more to the abstract idea to render it patent eligible. At step (a), some device - presumably a generic computer - collects data communication usage information from a number of conventional devices for network communication.[4] In essence, the generic computer collects information from conventional devices to create records. This data collection occurs through gatherers, which are software. See col. 6 ll. 25-35. At steps (b) through (g), the same generic computer performs filtering, completing, storing, allowing, submitting, and outputting. The generic computer interacts with a database, which stores records and responds to queries. All of those actions are conventional for both generic computers and generic databases.

As it is directed to essentially the same invention, claim 13 is also directed to ineligible subject matter. Dependent claims 2, 7, and 8 do not add sufficiently "more" to render them patent eligible, and Amdocs does not argue that they do. See Opp'n at 26-27. Therefore, the asserted claims of the '984 Patent are also invalid.

[4] The claim also lists a "firewall," which is not a device at all.

E. Response Regarding Novelty

Amdocs often argues that it developed a new process that solved a problem existing in the art. See, e.g., Opp'n at 1, 6-7. That argument misses the point. The concern of § 101 is not novelty, but preemption. In Alice, the Supreme Court articulated concerns that claims to abstract ideas would preempt the "building blocks" of research - in essence, that people who merely had the idea of how to solve a problem, but did not actually know how to solve the problem, would prevent others from performing research and achieving actual solutions. See 134 S.Ct. at 2354. A person may have invented an entirely new and useful advance, but if the patent claims sweep too broadly, or only claim the idea that was achieved rather than implementation of the idea, § 101 directs that the patent is invalid. Amdocs's asserted claims recite such conventional operation, in such a general way, that even if the inventor had developed an actual working system, the patent claims could foreclose fields of research beyond the actual invention. Accordingly, all asserted claims are invalid as patent-ineligible.[5]

[5] At oral argument, Amdocs also argued that the asserted claims, across all four patents, were directed to eligible subject matter because a member of the public would have notice of which activities the patent covered and so could avoid infringement. Transcript of Oct. 24, 2014 Oral Argument [Dkt. No. 300] at 11-13. That argument misses the mark. The exceptions to § 101 seek to avoid preemption, not ensure that the patent provides adequate notice to the public. Instead, 35 U.S.C. § 112 addresses the notice function. Nautilus, Inc. v. Biosig Instruments, Inc., 134 S.Ct. 2120, 2130 (2014).

III. CONCLUSION

For the reasons stated above, Defendants' Motion for Judgment on the Pleadings [Dkt. No. 293] will be GRANTED by an appropriate Order to be issued with this Memorandum Opinion.

Entered this 24th day of October, 2014.

Alexandria, Virginia

/s/ LMB
Leonie M. Brinkema
United States District Judge

US006947984B2

(12) **United States Patent**
Schweitzer et al.

(10) **Patent No.: US 6,947,984 B2**
(45) **Date of Patent: *Sep. 20, 2005**

(54) **SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR REPORTING IN A NETWORK-BASED FILTERING AND AGGREGATING PLATFORM**

(75) Inventors: **Limor Schweitzer**, Santa Clara, CA (US); **Eran Wagner**, Cupertino, CA (US); **Tal Givoly**, Cupertino, CA (US)

(73) Assignee: **XACCT Technologies, Ltd.**, Ramat Gan (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 392 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **09/935,129**

(22) Filed: **Aug. 21, 2001**

(65) **Prior Publication Data**

US 2002/0013841 A1 Jan. 31, 2002

Related U.S. Application Data

(63) Continuation of application No. 09/442,876, filed on Nov. 18, 1999, now Pat. No. 6,418,467, which is a continuation of application No. PCT/US98/24963, filed on Nov. 20, 1998.

(60) Provisional application No. 60/109,095, filed on Nov. 19, 1998, and provisional application No. 60/066,898, filed on Nov. 20, 1997.

(51) **Int. Cl.**[7] **G06F 15/173**

(52) **U.S. Cl.** **709/224**; 709/200; 709/202; 709/203; 709/223; 709/229; 709/230; 379/111; 379/115; 379/117; 379/134; 370/352; 370/401

(58) **Field of Search** 709/223, 224, 709/203, 202, 229, 230; 379/111, 115, 117, 134, 112; 370/389, 252, 352, 401; 703/27; 707/1, 101

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,285,494	A	*	2/1994	Sprecher et al.	455/423
5,333,183	A	*	7/1994	Herbert	379/112.07
5,557,746	A	*	9/1996	Chen et al.	709/202
5,659,601	A		8/1997	Cheslog	435/406
5,778,350	A	*	7/1998	Adams et al.	707/1
5,781,729	A	*	7/1998	Baker et al.	709/230
5,870,557	A		2/1999	Bellovin et al.	
5,930,773	A		7/1999	Crooks et al.	705/30
5,958,010	A	*	9/1999	Agarwal et al.	709/224
6,032,147	A	*	2/2000	Williams et al.	707/101
6,088,688	A		7/2000	Crooks et al.	705/412
6,104,704	A	*	8/2000	Buhler et al.	370/252
6,148,335	A		11/2000	Haggard et al.	709/224
6,157,648	A	*	12/2000	Voit et al.	370/401
6,230,203	B1	*	5/2001	Koperda et al.	709/229
6,272,126	B1	*	8/2001	Strauss et al.	370/352
6,308,148	B1	*	10/2001	Bruins et al.	703/27
6,405,251	B1	*	6/2002	Bullard et al.	709/224
6,418,467	B1	*	7/2002	Schweitzer et al.	709/223
6,470,386	B1	*	10/2002	Combar et al.	709/224
6,598,078	B1	*	7/2003	Ehrlich et al.	709/224

FOREIGN PATENT DOCUMENTS

EP	1006690 A2	6/2000
EP	1039693 A2	9/2000

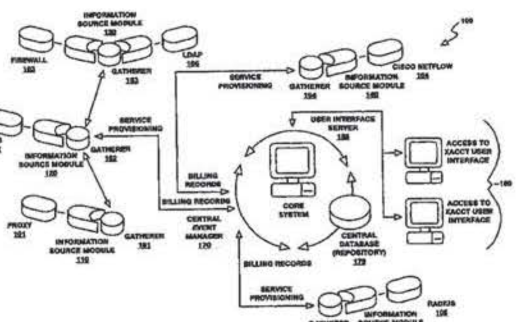
* cited by examiner

Primary Examiner—Zarni Maung
Assistant Examiner—Hai V. Nguyen
(74) *Attorney, Agent, or Firm*—Zilka-Kotab, PC

(57) **ABSTRACT**

A system with accompanying method and computer program product are provided for reporting on the collection of network usage information from a plurality of network devices. Included is a plurality of information source modules for collecting network communications usage information in real-time from a plurality of network devices. Gatherers are coupled to the information source modules for filtering and aggregating the network communications usage information. Coupled to the gatherers is a central event manager. The central event manager is adapted for completing a plurality of data records from the filtered and aggregated network communications usage information. The data records correspond to network usage by a plurality of users. Also included is a database coupled to the central event manager for storing the plurality of data records. Logic is provided for allowing the selection of one of a plurality of reports for reporting purposes, submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices, and outputting a report based on the queries.

18 Claims, 7 Drawing Sheets



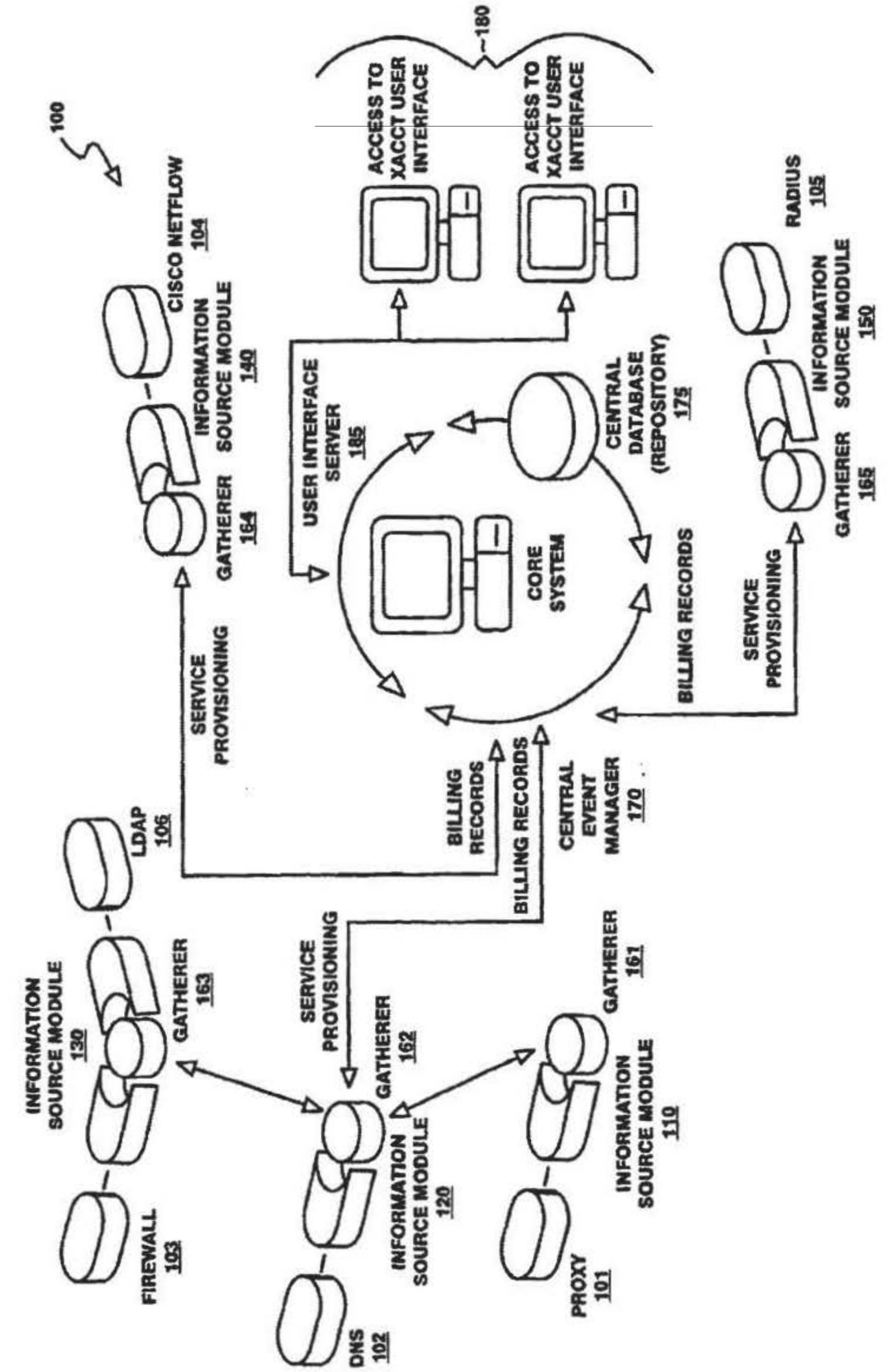
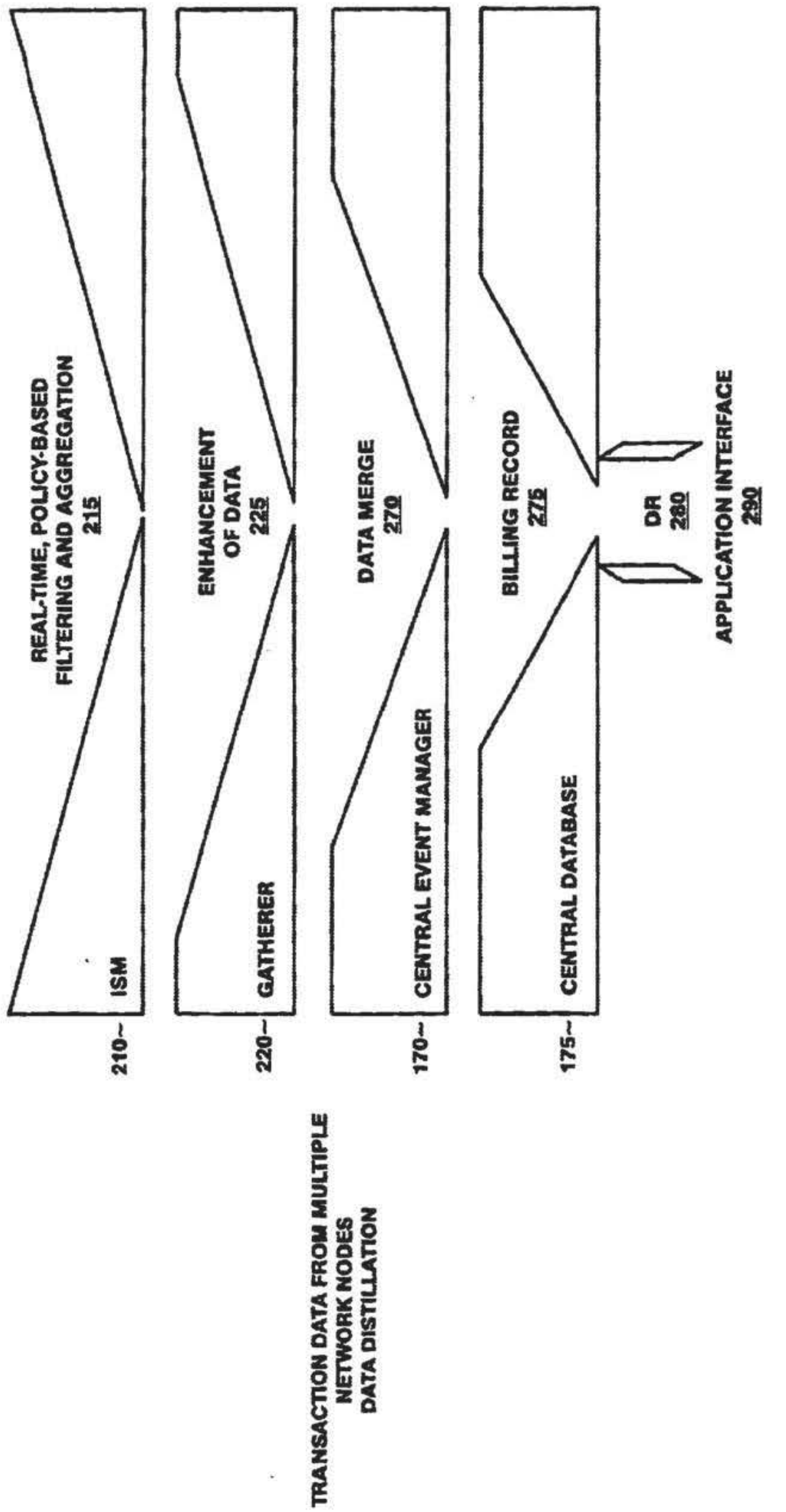

100
CISCO NETFLOW 104
INFORMATION SOURCE MODULE 140
GATHERER 164
ACCESS TO XACCT USER INTERFACE
ACCESS TO XACCT USER INTERFACE
180
USER INTERFACE SERVER 185
CORE SYSTEM
CENTRAL DATABASE (REPOSITORY) 175
RADIUS 105
INFORMATION SOURCE MODULE 150
GATHERER 165
SERVICE PROVISIONING
BILLING RECORDS
SERVICE PROVISIONING
LDAP 106
BILLING RECORDS
BILLING RECORDS
CENTRAL EVENT MANAGER 170
INFORMATION SOURCE MODULE 130
GATHERER 163
SERVICE PROVISIONING
GATHERER 162
GATHERER 161
FIREWALL 103
DNS 102
INFORMATION SOURCE MODULE 120
PROXY 101
INFORMATION SOURCE MODULE 110

FIG. 1



TRANSACTION DATA FROM MULTIPLE NETWORK NODES DATA DISTILLATION
210~
ISM
REAL-TIME, POLICY-BASED FILTERING AND AGGREGATION 215
220~
GATHERER
ENHANCEMENT OF DATA 225
170~
CENTRAL EVENT MANAGER
DATA MERGE 270
175~
CENTRAL DATABASE
BILLING RECORD 275
DR 280
APPLICATION INTERFACE 290

FIG. 2

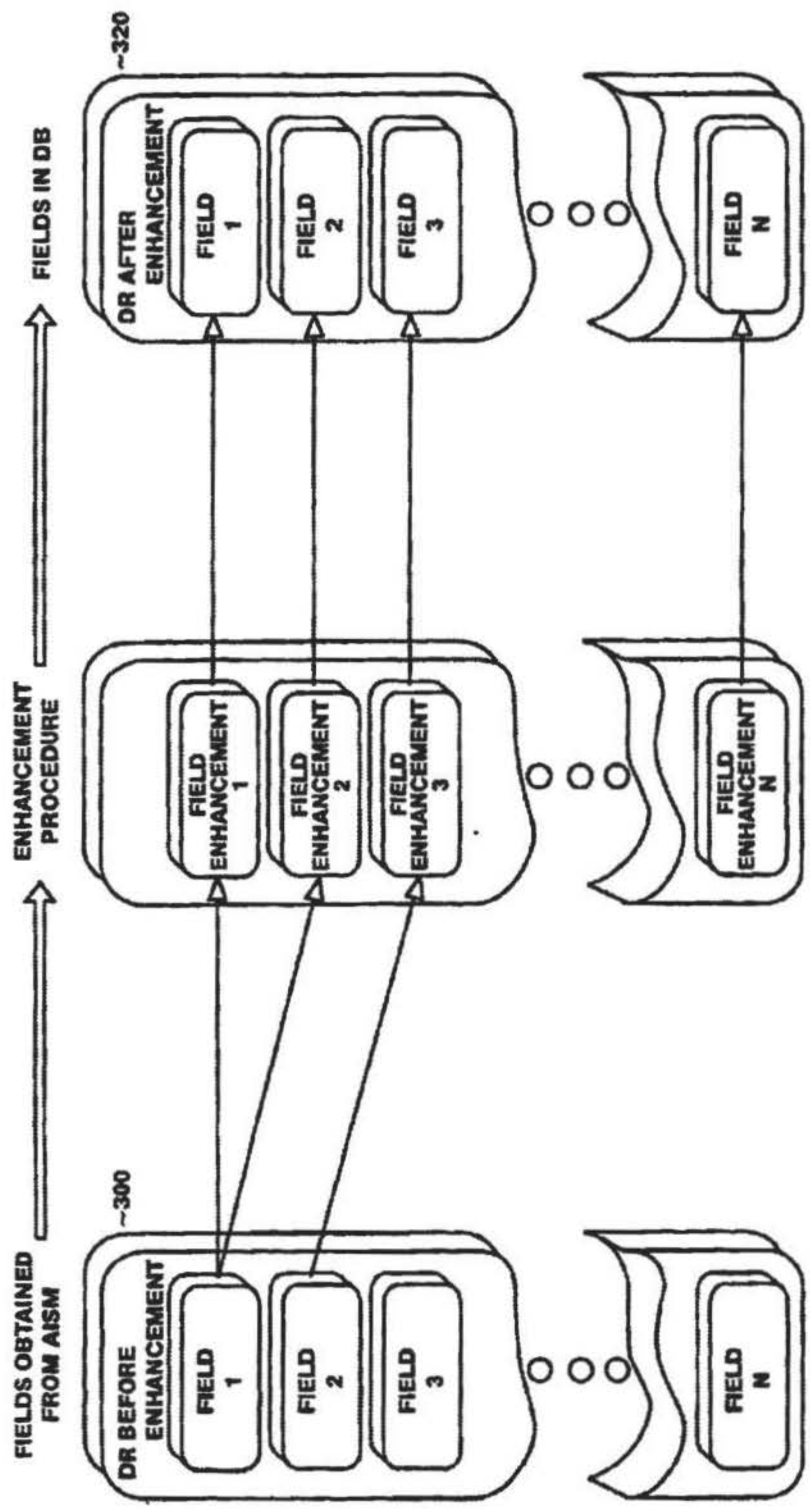

FIELDS OBTAINED FROM AISM
ENHANCEMENT PROCEDURE
FIELDS IN DB
~300
DR BEFORE ENHANCEMENT
FIELD 1
FIELD 2
FIELD 3
FIELD N
FIELD ENHANCEMENT 1
FIELD ENHANCEMENT 2
FIELD ENHANCEMENT 3
FIELD ENHANCEMENT N
~320
DR AFTER ENHANCEMENT
FIELD 1
FIELD 2
FIELD 3
FIELD N

FIG. 3

Case: 15-1180 Document: 36 Page: 39 Filed: 05/06/2015

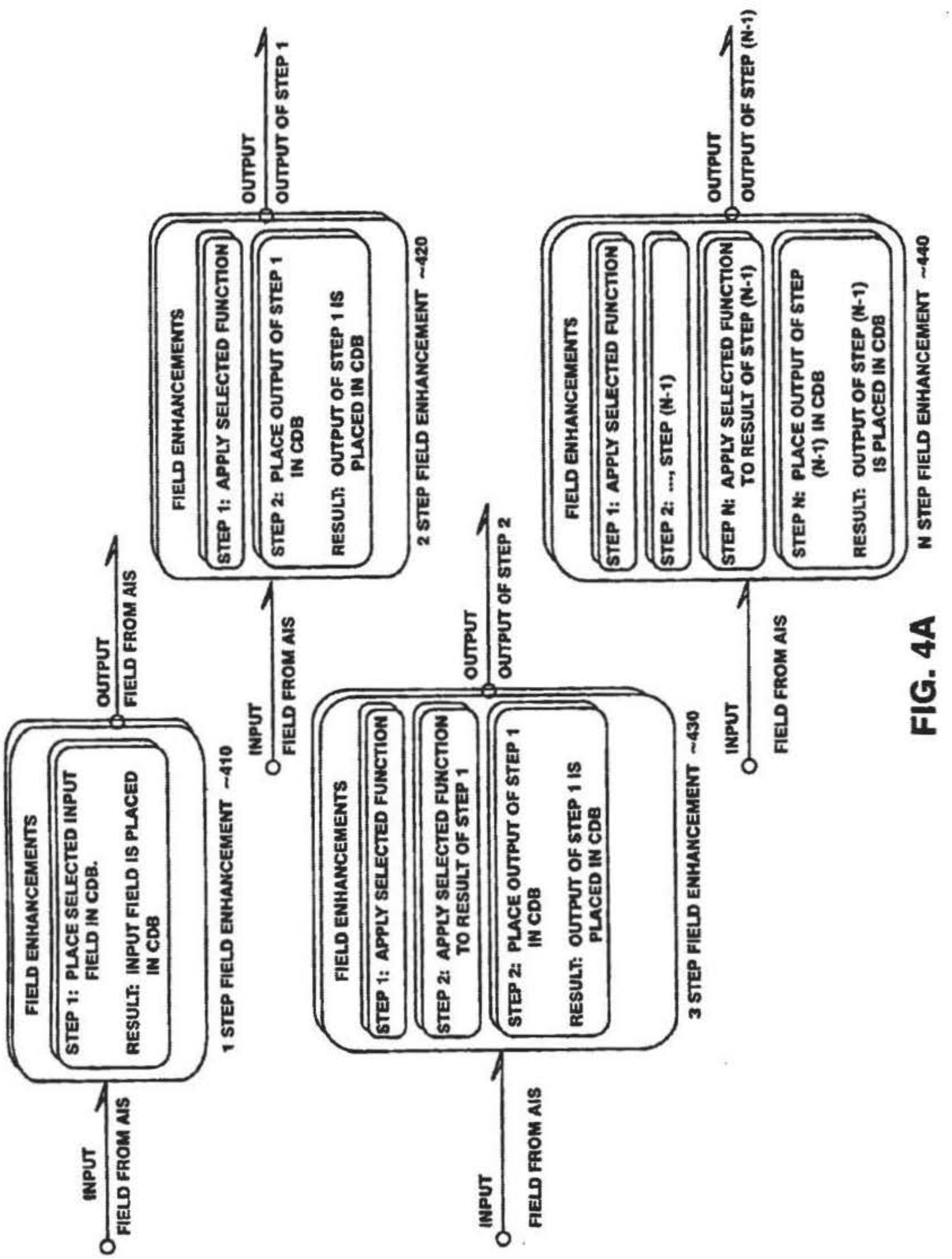


FIG. 4A

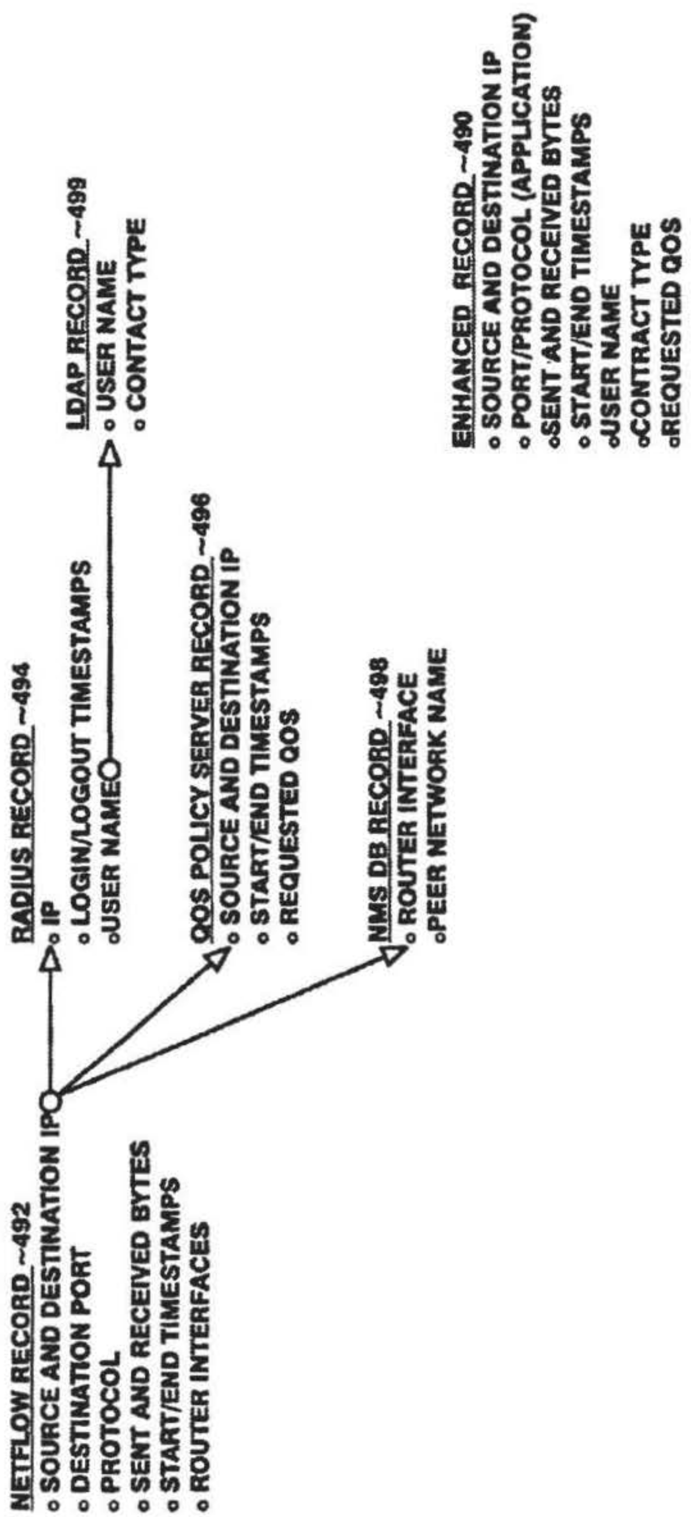

NETFLOW RECORD ~492
SOURCE AND DESTINATION IP
DESTINATION PORT
PROTOCOL
SENT AND RECEIVED BYTES
START/END TIMESTAMPS
ROUTER INTERFACES
RADIUS RECORD ~494
IP
LOGIN/LOGOUT TIMESTAMPS
USER NAME
QOS POLICY SERVER RECORD ~496
SOURCE AND DESTINATION IP
START/END TIMESTAMPS
REQUESTED QOS
NMS DB RECORD ~498
ROUTER INTERFACE
PEER NETWORK NAME
LDAP RECORD ~499
USER NAME
CONTACT TYPE
ENHANCED RECORD ~490
SOURCE AND DESTINATION IP
PORT/PROTOCOL (APPLICATION)
SENT AND RECEIVED BYTES
START/END TIMESTAMPS
USER NAME
CONTRACT TYPE
REQUESTED QOS

FIG. 4B

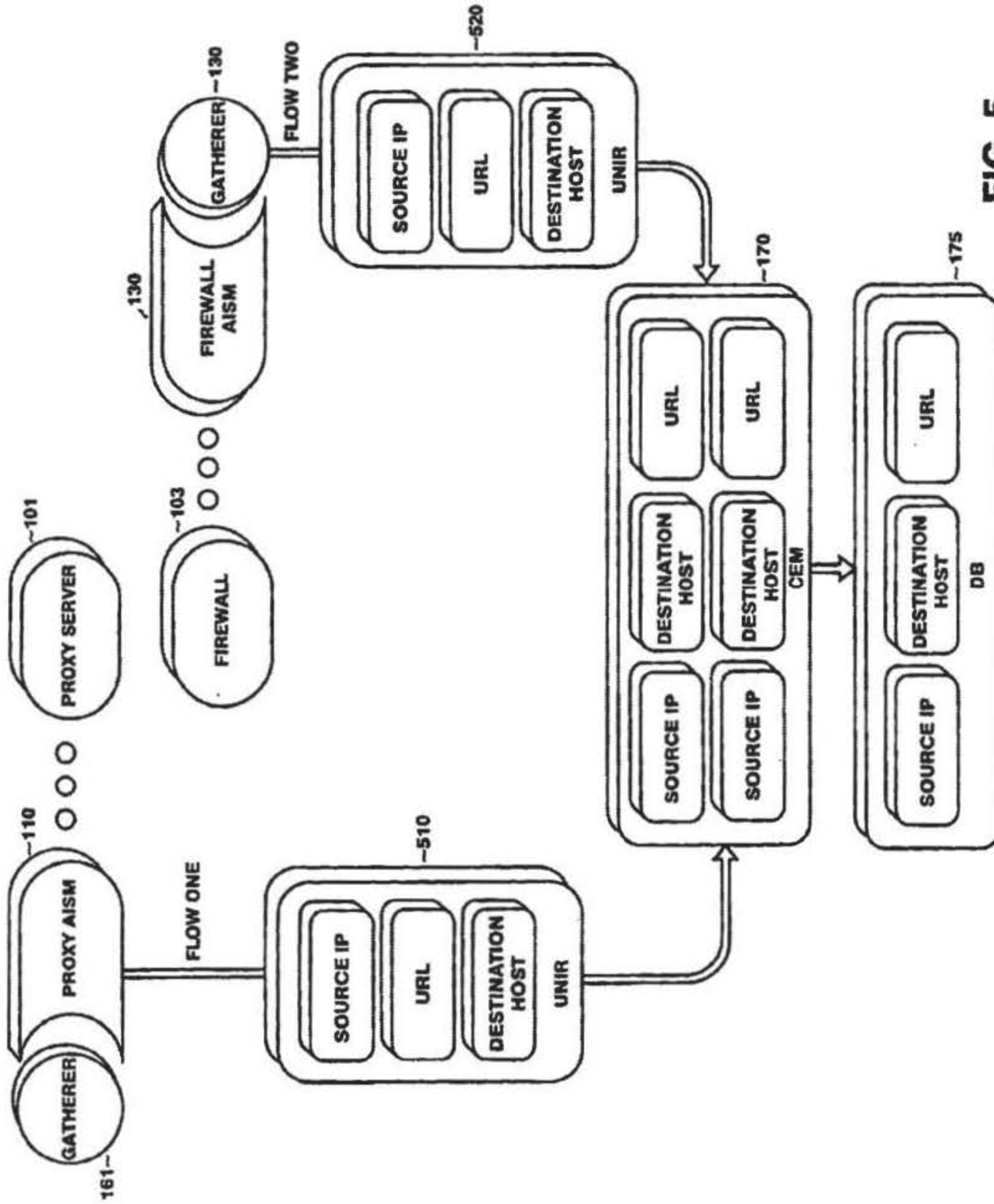

GATHERER
161
PROXY AISM
110
PROXY SERVER
101
FIREWALL
103
FIREWALL AISM
130
GATHERER
130
FLOW ONE
FLOW TWO
SOURCE IP
URL
DESTINATION HOST
UNIR
510
520
CEM
170
DB
175

FIG. 5

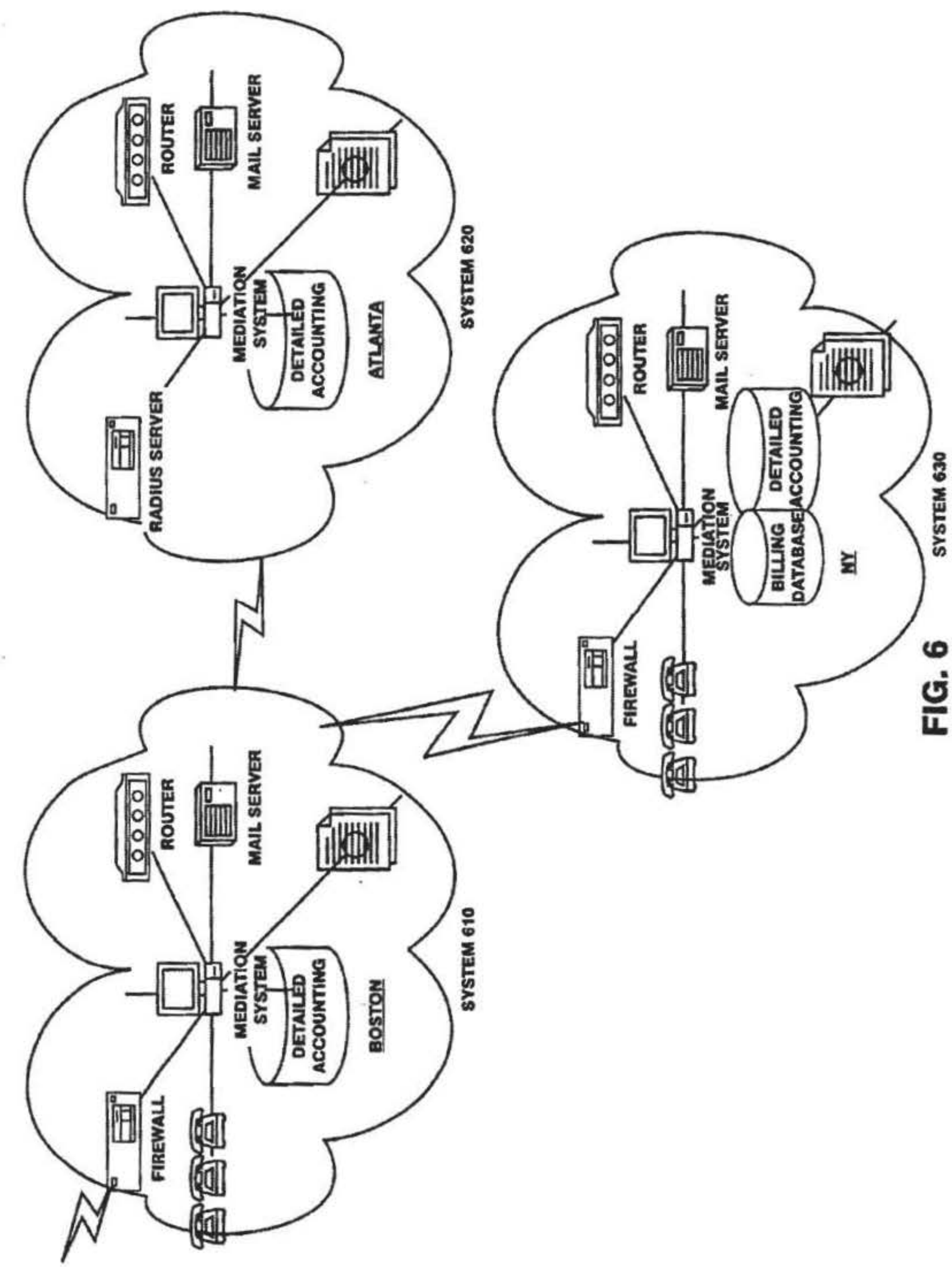

RADIUS SERVER
ROUTER
MAIL SERVER
MEDIATION SYSTEM
DETAILED ACCOUNTING
ATLANTA
SYSTEM 620
FIREWALL
ROUTER
MAIL SERVER
MEDIATION SYSTEM
DETAILED ACCOUNTING
BOSTON
SYSTEM 610
FIREWALL
ROUTER
MAIL SERVER
MEDIATION SYSTEM
BILLING DATABASE
DETAILED ACCOUNTING
NY
SYSTEM 630

FIG. 6

SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR REPORTING IN A NETWORK-BASED FILTERING AND AGGREGATING PLATFORM

This application is a continuation of the application Ser. No. 09/442,876, which was filed on Nov. 18, 1999, issued as U.S. Pat. No. 6,418,467 B1 on Jul. 9, 2002.

This present application claims a continuation of the patent No.6,418,467 B1, which is a continuation of a PCT application filed Nov. 20, 1998 under Ser. PCT/US98/24963, provisional patent application filed Nov. 19, 1998 under Ser. 60/109,095, and provisional patent application filed Nov. 20, 1997 under Ser. No. 60/066,898.

BACKGROUND OF THE INVENTION

A. Field of the Invention

This invention relates to the field of computer networks. In particular, the invention relates to accounting and billing for services in a computer network.

B. Description of the Related Art

The low cost of Internet connectivity and a wide range of services are driving and more people onto the Internet, which is driving the deployment of TCP/IP networks. This process has led to a new market of client-server applications that enables the user to interact with other users and computer systems around the world. The use of these applications is consuming more and more Intranet and Internet bandwidth.

New applications such as "voice over IP (Internet Protocol)" and streaming audio and video require even more bandwidth and a different quality of service than email, or other less real-time applications. Also, the type quality of service can vary according to the needs of the user. For example, typically, businesses do not tolerate unavailable network services as easily as consumers. Internet Service Providers (ISPs) therefore would like to price their available bandwidth according to a user's needs. For example, flat monthly pricing may be the best billing model for consumers, but businesses may want to be billed according to their used bandwidth at particular qualities of service.

As ISPs continue to differentiate themselves by providing additional services, enterprise information technology managers will face similar problems to account for the escalating Intranet operating costs.

Therefore, ISPs and enterprise information technology managers will want to account for session logging, bandwidth usage, directory data and application session information from a variety of sources.

Due to the diversity of IP data sources (e.g., routers, hubs etc.), the need for effect tracking far exceeds the problems addressed by telephone companies. Telephone companies track information such as circuit usage so it can be correlated with account information. For example, businesses may use leased lines, consumers may have "Friends and Family" plans, cellular phones have different roamer fees according to the location of the user, etc. Typically, the phone company captures all of the data and uses batch processing to aggregate the information into specific user accounts. For example, all the long distance calls made during a billing period are typically correlated with the Friends and Family list for each phone account at the end of a billing period for that account. This requires a significant amount of computing power. However, this type of problem is significantly simpler than attempting to track and bill for every transaction in an IP network. Therefore, what is desired is a system that allows for accounting and billing of transactions on IP based networks.

The problem is even more difficult in IP network traffic because the information sources can exist and many different levels of the OSI network model, throughout heterogeneous networks. Potential sources of information include packet use from routers, firewall authentication logging, email data, ISP session logging, and application layer use information. Therefore, what is desired is a system and method that track IP network usage information across multiple layers of the OSI network model.

SUMMARY OF THE INVENTION

A system with accompanying method and computer program product are provided for reporting on the collection of network usage information from a plurality of network devices. Included is a plurality of information source modules for collecting network communications usage information in real-time from a plurality of network devices. Gatherers are coupled to the information source modules for filtering and aggregating the network communications usage information. Coupled to the gatherers is a central event manager. The central event manager is adapted for completing a plurality of data records from the filtered and aggregated network communications usage information. The data records correspond to network usage by a plurality of users. Also included is a database coupled to the central event manager for storing the plurality of data records. Logic is provided for allowing the selection of one of a plurality of reports for reporting purposes, submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices, and outputting a report based on the queries.

BRIEF DESCRIPTION OF THE FIGURES

The figures illustrate the invention by way of example. The invention is not meant to be limited to only those embodiments of shown in the Figures. The same reference in different figures indicates the same element is being used in those figures.

FIG. **1** illustrates a system including one embodiment of the invention.

FIG. **2** illustrates an example of the data distillation used in the system of FIG. **1**.

FIG. **3** illustrates data enhancements used in the data distillation.

FIG. **4A** illustrates example field enhancements that can be included in the data enhancements.

FIG. **4B** illustrates the creation of an enhanced record.

FIG. **5** illustrates an example record merge.

FIG. **6** illustrates an example of an alternative embodiment of the system.

DETAILED DESCRIPTION

A. System Overview

One embodiment of the system includes a multi-source, multi-layer network usage metering and mediation solution that gives Network Service Providers (NSPs), including

Internet Service Providers (ISPs) and enterprise network (Intranet) operators, the information needed to set the right-price for IP (Internet Protocol) services. With the system, the providers can generate accurate usage-based billing and implement usage-based charge-back models. The system derives IP session and transaction information, collected in real time, from a multitude of network elements. The system gathers, correlates, and transforms data from routers, switches, firewalls, authentication servers, LDAP, Web hosts, DNS, and other devices to create comprehensive usage and billing records.

The system transforms raw transaction data from network devices into useful billing records though policy-based filtering, aggregation, and merging. The result is a set of detail records (DRs). In some embodiments, the detail records are XaCCT Detail Records (XDRs™) available from XaCCT Technologies. DRs are somewhat similar in concept to the telephony industry's Call Detail Records (CDRs). Thus, DRs can be easily integrated with existing Customer Care and Billing (CCB) systems.

In addition to billing data, DRs enable NSPs to deploy new services based on documented usage trends, plan network resource provisioning, and audit service usage. The system provides a clear picture of user-level network service use by tracking a variety of metrics such as actual session Quality of Service (QoS),traffic routes, and end-user application transactions.

The system is based on a modular, distributed, highly scalable architecture capable of running on multiple platforms. Data collection and management is designed for efficiency to minimize impact on the network and system resources.

The system minimizes network impact by collecting and processing data close to its source. Modular architecture provides maximum configuration flexibility, and compatibility with multiple network information sources.

The system, or other embodiments, may have one or more of the following features.

Data collection can be from a wide range of network devices and services, spanning all layers of the network—from the physical layer to the application layer.

Real-time, policy-based filtering, aggregation, enhancement and merging creates accurate, detailed and comprehensive session detail records (DRs).

Real time correlation of data from various sources allows billing record enhancement.

Leverages existing investment through integration with any customer care & billing solution, reducing costs, minimizing risks and shortened time-to-market.

Non-intrusive operation eliminates any disruption of network elements or services.

Web-based user interface allows off-the-shelf browsers to access the system, on-demand, locally or remotely.

Carrier-class scalability allows expansion to fit an NSPs needs without costly reconfiguration.

Distributed filtering and aggregation eliminates system capacity bottlenecks.

Efficient, centralized system administration allows on-the-fly system reconfigurations and field upgrades.

Customized reporting with built-in report generation or an NSPs choice of off-the-shelf graphical reporting packages.

Comprehensive network security features allow secure communication between system components and multiple levels of restricted access.

B. System Details

The following describes the system **100** of FIG. **1**. The system **100** allows NSPs to account for and bill for IP network communications. The following paragraphs first list the elements of FIG. **1**, then describes those elements and then describes how the elements work together. Importantly, the distributed data gathering, filtering and enhancements performed in the system **100** enables load distribution. Granular data can reside in the peripheries of the system **100**, close to the information sources. This helps avoids reduce congestion in network bottlenecks but still allows the data to be accessible from a central location. In previous systems, all the network information flows to one location, making it very difficult to keep up with the massive record flows from the network devices and requiring huge databases.

The following lists the elements of FIG. **1**. FIG. **1** includes a number of information source modules (ISMs) including an ISM **110**, an ISM **120**, an ISM **130**, an ISM **136**, an ISM **140**, and an ISM **150**. The system also includes a number of network devices, such as a proxy server **101**, a DNS **102**, a firewall **103**, an LDAP **106**, a CISCO NetFlow **104**, and a RADIUS **105**. The system also includes a number of gatherers, such as a gatherer **161**, a gatherer **162**, a gatherer **163**, a gatherer **164**, and a gatherer **165**. The system of FIG. **1** also includes a central event manager (CEM) **179** and a central database (repository) **175**. The system also includes a user interface server **185** and a number terminals or clients **180**.

This paragraph describes how the elements of FIG. **1** are coupled. The various network devices represent devices coupled to an IP network such as the Internet. The network devices perform various functions, such as the proxy server **101** providing proxy service for a number of clients. Each network device is coupled to a corresponding ISM. For example, the proxy server **101** is coupled to the ISM **110**. The DNS **102** is coupled to the ISM **120**. The firewall **103** is coupled to the ISM **130**. The ISM **136** is coupled to the LDAP **106**. The ISM **140** is coupled to the CISCO NetFlow **104**. The ISM **150** is coupled to the RADIUS **105**. Each gatherer is associated with at least one ISM. Thus, the gatherer **161** is associated with the ISM **110** and is therefore coupled to that ISM. The gatherer **162** is coupled to the ISM **120**. The gatherer **163** is coupled to the ISM **130** and the ISM **136**. The gatherer **164** is coupled to the ISM **140**. The gatherer **165** is coupled to the ISM **150**. The various gatherers are coupled to the CEM **170**. The user interface server is coupled to the terminals **180**, and the CEM **170**.

The following paragraphs describe each of the various elements of FIG. **1**.

Network Devices

The network devices represent any devices that could be included in a network. (Throughout the description, a network device, unless specifically noted otherwise, also refers to an application server.) A network device represents a subset of information sources that can be used by the system **100**. That is, the network devices are merely representative of the types of sources of information that could be accessed. Other devices such as on-line transaction processing databases can be accessed in other embodiments of the invention. Typically, the network devices keep logging and statistical information about their activity. A network information source can be the log file of a mail server, the logging facility of a firewall, a traffics statistics table available on a router and accessible through SNMP, a database entry accessible through the Internet, an authentication server's query interface, etc. The network devices represent the information sources accessed by the ISMs.

Each type of network device can be accessing using a different method or protocols. Some generate logs while

others are accessible via SNMP, others have proprietary APIs or use other protocols.

ISMs

The ISMs act as an interface between the gatherers and the network devices enabling the gatherers to collect data from the network devices. Thus, the ISMs represent modular, abstract interfaces that are designed to be platform-neutral. The information source modules act as interfaces or "translators", sending IP usage data, in real time, from the network devices to the gatherers. Each ISM is designed for a specific type of network data source. (In other embodiments, some ISM are generic in that they can extract information from multiple network devices). ISMs can be packaged separately, allowing NSPs to customize ISM configurations to meet the specific requirements of their network. For example, in the system of FIG. **1**, if the NSP did not have Cisco NetFlow devices, then the ISM **140** would not have to be included.

The ISMs can communicate with its corresponding network device using protocols and formats such as UDP/IP, TCP/IP, SNMP, telnet, file access, ODBC, native API, and others.

In some embodiments, the reliability of system **100** is enhanced through on-the-fly dynamic reconfiguration, allowing the NSP to add or remove modules without disrupting ongoing operations. In these embodiments, the CEM **170** can automatically update the ISMs.

The following ISMs are available in some embodiments of the invention.

- Categorizer—Classifies a session to a category according to user-defined Boolean expression.
- DNS (e.g. ISM **120**)—Resolves host names and IP addresses.
- Generic Proxy Server (e.g., ISM **110**)—Collects data from access logs in a common log format.
- Port/Protocol Resolution—Converts protocol/port information to account names and vice versa.
- CheckPoint FireWall-**1**—Collects data from FireWall-**1** accounting log and security log.
- Cisco IOS IP Accounting—Collects accounting data from a Cisco router using IOS IP accounting.
- Cisco NetFlow Switching—Collects session data from a Cisco router via NetFlow switching.
- Netscape Proxy Server—Collects data from a Netscape Proxy Server.
- Microsoft Proxy Server—Collects data from a Microsoft Proxy Server.

ISMs can be synchronous, asynchronous or pipe.

The data from an asynchronous ISM is dynamic so that the asynchronous ISM reacts to the information and relays it to the associated gatherer without prompting from other information sources in the system **100**. If the firewall **103** were a CheckPoint-Fire Wall-**1**, then the ISM **130** would be an example of an asynchronous ISM. When a network session is initiated, the details are recorded by the Fire Wall-**1** **103**. The corresponding ISM **130** receives the details and passes them on automatically to the gatherer **163**.

Synchronous ISMs provide its information only when accessed by a gatherer. The ISM **120** is an example of a synchronous ISM. The DNS server **102** maintains information matching the IP addresses of host computers to their domain addresses. The ISM **120** accesses the DNS server **102** only when the ISM **120** receives a request from the gather **162**. When the DNS server **102** returns a reply, the ISM **120** relays the reply information to the gatherer **162**.

Pipe ISMs operate on record flows (batches of records received from information sources). Pipe ISMs process one or more enhancement flows the records as the flows arrive. The pipe ISM may initiate new record flows or may do other things such as generate alerts or provision network elements to provide or stop services. The pipe is implemented as an ISM to keep the internal coherency and logic of the architecture. (Record flows can terminate in a database or in a pipe ISM. The pipe ISM can perform filtering and aggregation, send alarms, or act as a mediation system to provision network elements when some event occurs or some accumulated value is surpassed. Specifically, pipe ISMs can act to enable pre-payment systems to disable certain services such as a voice IP call, when the time limit is surpassed or amount of data is reached.)

The gatherers can include caches and buffers for storing information from the ISMs. The buffers allow the gatherers to compensate for situations where there is a loss of connection with the rest of the system **100**. The cache sizes can be remotely configured. The cache minimizes the number of accesses to the Information Source.

ISM queries can be cached and parallelized. Caching of synchronous ISM queries provides for fast responses. Parallelizing queries allows for multiple queries to be processed at the same time.

Gatherers

The gatherers gather the information from the ISMs. In some embodiments, the gatherers are multi-threaded, lightweight, smart agents that run on non-dedicated hosts, as a normal user application on Windows NT or Unix, as a background process, or daemon. What is important though is that the gatherers can be any hardware and/or software that perform the functions of a gatherer.

The gatherers can be installed on the same network segment as the network device such as router and switch or on the application server itself. This placement of a gatherer minimizes the data traffic impact on the network.

The gatherers collect network session data from one or more ISMs. Session data can be sent to another gatherer for enhancement or to the CEM **170** for merging and storing in the central database **170**. The gatherers can be deployed on an as needed basis for optimal scalability and flexibility.

The gatherers perform flexible, policy-based data aggregation. Importantly, the various types of ISMs provide different data and in different formats. The gatherers normalize the data by extracting the fields needed by the CEM **170** and filling in any fields that may be missing. Thus, the gatherers act as a distributed filtering and aggregation system. The distributed data filtering and aggregation eliminates capacity bottlenecks improving the scalability and efficiency of the system **100** by reducing the volume of data sent on the network to the CEM **170**.

Aggregation can be done by accumulating groups of data record flows, generating a single data record for each group. That single record then includes the aggregated information. This reduces the flow of the data records.

Filtering means discarding any record that belongs to a group of unneeded data records. Data records are unneeded if they are known to be collected elsewhere. A policy framework enables the NSP to configure what to collect where.

Filtering and/or aggregation can be done at any point along a data enhancement (described below) so that aggregation schemes can be based on enhanced data records as they are accumulated. The filtering and/or aggregation points are treated by the system **100** as pipe ISMs which are flow termination and flow starting points (ie: like an asynchronous ISM on the starting end and like a database on the terminating end). Data enhancement paths and filtering

and/or aggregation schemes can be based on accumulated parameters such as user identification information and a user's contract type.

As noted above, the PISM can be used in the context of filtering and/or aggregation. One or more record flows can terminate at the PISM and can be converted into one or more new record flows. Record flows are grouped based on matching rules that apply to some of the fields in the record flows, while others are accumulated or undergo some other operation such as "maximum" or "avarage". Once the groups of accumulated records have reached some threshold, new accumulated records are output. This can be used for example in order to achieve a business-hybrid filtering and aggregation data reduction by imposing the business rules or the usage-based products that are offered to the customer, onto the record flows as they are collected in real-time. This is done instead of previous system where, the information is stored in a database and then database operations are performed in order to create bills or reports. The filtering and aggregation reduces the amount of data that is stored in the central database **175** while not jeopardizing the granularity of data that is necessary in order to create creative usage-based products.

Typically, data collected from a single source does not contain all the information needed for billing and accounting, such as user name and organization. In such cases, the data is enhanced. By combining IP session data from multiple sources, such as authentication servers, DHCP and Domain Name servers, the gatherers create meaningful session records tailored to the NSP's specific requirements. In the example of FIG. **1**, the gatherer **161** can provide information to the gatherer **162** so that the source IP address for an Internet session from the proxy server **101** can be combined with the domain address from the DNS server **102**.

The enhancement procedure can be triggered by an asynchronous ISM. The information from the asynchronous ISM is associated with field enhancements in the central database **175**. A field enhancement defines how a field in the central database is filled from the source data obtained from the asynchronous ISM. Through the field enhancements, the missing parameters are added to a record using the data collected from one or more synchronous ISMs. Enhancements are described in detail below.

The gatherers can include caches and buffers for storing information from the ISMs. The buffers allow the gatherers to compensate for situations where there is a loss of connection with the rest of the system **100**. The caches can reduce the number of accesses to an information source. The buffer and/or cache sizes can be remotely configured.

Central Event Manager (CEM)

The Central Event Manager (CEM) **170** acts as the central nervous system of the system **100**, providing centralized, efficient management and controls of the gatherers and the ISMs.

The CEM **170** can perform one or more of the following tasks:

Coordinates, controls, and manages the data collection process. The CEM **170** coordinates the operation of the gatherers and manages the flow of data through the system **100** through the collection scheme defined in the system configuration. The latter includes the configuration of the gatherers, the ISMs, the network devices, the fields in the central database **175** (described below), and the enhancement procedures. Based on the collection scheme the CEM **170** determines the system **100**'s computation flow (the set of operations the system **100** must perform to obtain the desired information). The CEM **170** then controls all the gatherers, instructing them to perform, in a particular sequence, the operations defined in the computation flow. The CEM **170** receives the records collected by the gatherers and stores them in the central database **175**. NSPs can configure the CEM **170** to merge duplicate records before storing them in the central database **175**. Record merging is described below.

Performs clean-up and aging procedures in the database **175**. The system **100** collects and stores large amounts of session information every day. The CEM **170** removes old data to free space for new data periodically. The NSP defines the expiration period for the removal of old records. The CEM **170** is responsible for coordinating the removal of records from the central database **175**. The CEM **170** places a time stamp on every record when the record enters the central database **175** and deletes the record after the time period the NSP has defined elapses.

Provides centralized system-wide upgrade, licensing, and data security. The NSP can perform version upgrades of the system **100** at the CEM **170**. The gatherers can be automatically upgraded once a new version is installed on the host computer of the CEM **170**. ISMs are also installed via the CEM **170** and exported to the gatherers. The CEM **170** maintains a list of licenses installed in the system and verifies periodically if the system is properly licensed. This feature lets the NSP centrally install and uninstall licenses. It also prevents unlicensed use of the system **100** and any of its components.

Monitors the state of the gatherers and ISMs. The gatherers periodically communicate with the CEM **170**. The CEM **170** continuously monitors the state of each gatherer and network devices in the system **100**. The CEM **170** can be fault-tolerant, that is, it can recover from any system crash. It coordinates the recovery of the system **100** to its previous state.

Central Database

The central database **175** is the optional central repository of the information collected by the system **100**. The central database **175** is but one example of a sink for the data generated in the system **100**. Other embodiments include other configurations. The central database **175** stores and maintains the data collected by the gatherers, as well as the information on the configuration of the system **100**. Thus, in configuring the system **100**, the NSP defines what data will be stored in each field in the central database **175** and how that data is collected from the ISMs.

The information on network sessions is stored in the database in the form of a table. Each field in the table represents a network session parameter. Each record describes a network session. The system **100** has a set of pre-defined fields that are configured by the CEM **170** on installation. The NSP can modify the central database **175** structure by adding, deleting, or modifying fields. The NSP access the data in the central database **175** by running queries and reports. The old data is removed from the central database **175** to free space for new data periodically. You can specify the time interval for which records are stored in the central database **175**. The structure of the central database **175** with some of the predefined fields is illustrated in the following figure.

As each IP session may generate multiple transaction records, during the merge process the CEM **170** identifies and discards duplications, enhancing the efficiency of the

data repository. Generally, data records are passed through the merger program, in the CEM **170**, into the central database **175**. However, the data records are also cached so that if matching records appear at some point, the already stored records can be replaced or enhanced with the new records. The database tables that contain the record flows can be indexed, enhancing the efficiency of the data repository. A merge is achieved by matching some of the fields in a data record and then merging the matching records from at least two record flows, transforming them into one record before updating the central database **175**. In some embodiments, adaptive tolerance is used to match records. Adaptive tolerance allows for a variation in the values of fields that are compared (e.g., the time field value may be allowed to differ by some amount, but still be considered a match). The adaptive aspect of the matching can include learning the appropriate period to allow for the tolerance. The reason that the records that do not match any previous records are sent through into the central database **175**, in addition to being cached for later matching, is to avoid loss of data in case of system failure.

The following table illustrates an example of the types of records stored in the central database **175** by the CEM **170**.

Source IP	Destination IP	Source Host	Destination Host	Service	Date/Time	Duration	Total Bytes	Counter
199.203.132.187	204.71.177.35	pcLev.xacct.com	yahoo.com	http	1998-04-26 10:56:55	6464	435666	261019
199.203.132.131	207.68.137.59	prodigy.xacct.com	microsoft.com	telnet	1998-40-26 10:56:55	747	66743	261020
199.203.132.177	199.203.132.1	pcEitan.xacct.com	xpert.com	smtp	1998-04-26 10:56:55	82	55667	261021
199.203.132.173	204.162.80.182	pcAdi.xacct.com	cnet.com	http	1998-04-26 10:56:55	93	33567	261022

The system **100** supports a non-proprietary database format enabling the central database **175** to run on any of a number of commercially available databases (e.g., MS-SQL Server, Oracle Server, DB2, etc.).

User Interface Server and Clients

The User Interface Server (UIS) **185** allows multiple clients (e.g. terminals **180**) to access the system **100** through, the Microsoft Internet Explorer with Java™ Plug-in or Netscape Navigator with Java™ Plug-in. Other embodiments can use other applications to access the system **100**. The main function of the UIS **185** is to provide remote and local platform independent control for the system **100**. The UIS 185 can provide these functions through windows that correspond to the various components of the system **100**. Access to the system **100** can be password protected, allowing only authorized users to log in to the system and protecting sensitive information.

The NSP can perform one or more of the following main tasks through the UIS **185**:

Configure the system **100**.

Create and run queries and reports on network activity and resource consumption.

Register and license the system **100**.

C. Data Distillation

FIG. **2** illustrates the data distillation process performed by the system of FIG. **1**. The data distillation aggregates and correlate information from many different network devices to compile data useful in billing and network accounting.

First, the ISMs **210** gather data from their corresponding network device. Note that for some ISMs (e.g. pipe ISMs), real-time, policy-based filtering and aggregation **215** can also be done. This data is then fed to the gatherers **220**. The gatherers **220** perform data enhancement to complete the data from the ISMs **210**. The results are provided to the CEM **170**. The CEM **170** performs data merges **270** to remove redundant data. The merged data is then optionally stored in the central database **175** as a billing record **275** or is sent directly to an external system. The billing record information can be accessed from external applications, through the application interface **290**, via a data record **280**. Filtering and/aggregation and/or data enhancements can be done at any stage in the system **100**.

D. Data Enhancement

As mentioned above, the gatherers **220** provide data enhancement features to complete information received from the ISMs **210**. The following describes some example data enhancement techniques used in some embodiments of the invention.

FIG. **3** illustrates an example of data enhancement. Data enhancement comprises a number of field enhancements. A field enhancement specifies how the data obtained from the trigger of the enhancement procedure is processed before it is placed in a single field in the central database **175**. The data can be placed in the field directly, or new information may be added to the record by applying a Synchronous ISM function. (In the example below, the function is "resolve the IP address to a host FQDN"). Field enhancements may involve one or multiple steps. There is no limit to the number of steps in a Field Enhancement. The data record starts with fields obtained from an asynchronous ISM **300**. The fields in the DR **300** are then enhanced using the field enhancements. The enhanced fields result in the DR **320**.

A visual representation of an enhancement can be presented to the NSP. The enhancement may include an itinerary of ISMs starting off with an AISM, passing through PISMs, and terminating in the CEM **170**. Using this view of the system **100**, the NSP need not be shown the actual flow of data since the flow may be optimized later in order to achieve better performance. This is more of a graphical logical view of how the enhancement is achieved in steps. (PISMs can terminate more than one flow and initiate more than one flow.)

A visual representation of a field enhancement shows the per-field flow of data correlation. This process ends in the CEM **170** or in a PISM. The NSP supplies information telling the system **100** how to reach each of the terminating fields (in the CEM **170** or the PISM) starting off from the initiating fields (PISM or AISM). Each step of enhancement defines cross correlation with some SISM function.

FIG. **4A** illustrates various field enhancements (**410** through **440**). A field enhancement includes applying zero or more functions to a field before storing the field in a specified field in the central database **175**.

One-step Field Enhancement **410**. The initial source data from the asynchronous ISM is placed directly in a field in the

central database **175**. Example: the field enhancement for the Source IP field.

Two-step Field Enhancement **420**. The initial source data from the asynchronous ISM is used to obtain new additional data from a synchronous network device and the new data is placed in a field in the central database **175**. Example: the field enhancement for the Source Host field.

Three-step Enhancement **430**. The initial source data from the asynchronous ISM is used to obtain additional data from a synchronous ISM. The result is used to obtain more data from another ISM and the result is placed in a field in the central database **175**.

The following illustrates an example data enhancement. Suppose the data obtained from a proxy server **101** contains the source IP address of a given session, such as 199.203.132.2, but not the complete domain address of the host computer (its Fully Qualified Domain Name), such as www.xacct.com. The name of the host can be obtained by another network device—the Domain Name System (DNS **102**) server. The DNS server **102** contains information that matches IP addresses of host computers to their Fully Qualified Domain Names (FQDNs). Through an enhancement procedure the information collected from the proxy server **101** can be supplemented by the information from the DNS **102**. Therefore, the name of the host is added to the data (the data record) collected from the proxy server **101**. The process of adding new data to the data record from different network devices can be repeated several times until all required data is collected and the data record is placed in the central database **175**.

FIG. **4**B illustrates another example data enhancement where an enhanced record **490** is created from an initial netflow record **492**. Fields in the enhanced record **490** are enhanced from the radius record **494**, the QoS policy server record **496**, the NMS DB record **498**, and the LDAP record **499**.

Defining Enhancement Procedures

The following describes the process for defining enhancement procedures in some embodiments of the system. Typically defining an enhancement procedures for the system **100** includes (1) defining enhancement procedures for each asynchronous ISM and (2) configuring field enhancements for all fields in the central database **175** for which the NSP wants to collect data originating from an asynchronous ISM that triggers the corresponding enhancement procedure.

An enhancement procedure can be defined as follows:

1. Access the CEM **170** using the UIS **180**.
2. Select the enhancement procedures list using the UIS **180**.
3. Define the name of the new enhancement procedure.
4. Select a trigger for the new enhancement procedure. The trigger can correspond to any asynchronous ISM in the system **100**. Alternatively, the trigger can correspond to any asynchronous ISM in the system **100** that has not already been assigned to an enhancement procedure.
5. Optionally, a description for the enhancement procedure can be provided.
6. The new enhancement procedure can then be automatically populated with the existing fields in the central database **175**. Optionally, the NSP can define the fields (which could then be propagated to the central database **175**). Alternatively, based upon the type of asynchronous ISM, a preset set of fields could be proposed to the NSP for editing. What is important is that the NSP can define field procedures to enhance the data being put into the data records of the central database **175**.
7. The NSP can then define the field enhancements for every field in the new enhancement procedure for which the NSP wants to collect data from the ISM that is the trigger of the new enhancement procedure.

Defining Field Enhancements

Defining a field enhancement involves specifying the set of rules used to fill a database field from the information obtained from the trigger of the enhancement procedure. The NSP defines field enhancements for each field in which NSP wants to collect data from the trigger. If no field enhancements are defined, no data from the trigger will be collected in the fields. For example, suppose the firewall asynchronous ISM **130** that triggers an enhancement procedure. Suppose the central database **175** has the following fields: source IP, source host, destination IP, destination host, user name, total bytes, service, date/time, and URL. If the NSP wants to collect session data for each field except the URL from the firewall ISM **130**, which triggers the enhancement procedure, the NSP defines a field enhancement for each field with the exception of the URL.

In some embodiments, the field enhancements are part of the enhancement procedure and the NSP can only define and modify them when the enhancement procedure is not enabled.

The field enhancements can be defined in a field enhancement configuration dialog box. The field enhancement configuration dialog box can have two panes. The first displays the name of the enhancement procedure, the name of its trigger, and the name and data type of the field for which the NSP is defining the field enhancement. The second is dynamic and interactive. Its content changes depending on the NSP's input. When first displayed, it has two toggle buttons, End and Continue, and a list next to them. The content of the list depends on the button depressed.

When End is depressed, the list contains all output fields whose data type matches the data type of the field for which the NSP is defining the field enhancement. For example, if the field's data type is IP Address, the list contains all fields that are of the same type, such as source IP and destination IP that the AISM supplies. The fields in the list can come from two sources: (1) the source data which the gatherer receives from the trigger and (2) the result obtained by applying a synchronous ISM function as a preceding step in the field enhancement. The following notation is used for the fields:

OutputFieldName for the output of a field origination from the trigger

SISName.FunctionName(InputArgument).OutputField for the output of a field that is the result of applying a function

SISName . . . OutputField for the output of a field that is the result of applying a function as the final step of a field enhancement

The following examples are presented.

Source IP is the field provided by the trigger of the enhancement procedure that contains the IP address of the source host.

DNS . . . Host Name and DNS.Name(Source IP).Host name are the names of a field originating from the resolved function Name of a network device called DNS that resolves the IP address to a domain address. The input argument of the function is the field provided by the trigger of the enhancement procedure, called source IP. It contains the IP address of the source host. The function returns the output field called Host Name that contains the domain address of the source host. The notation DNS . . . Host Name is used when the field is the result of applying the function as the final step of a field enhancement. The notation is DNS.Name (Source IP).Host Name is used when the field is used as the input to another function.

In the user interface, if End is unavailable, none of the output fields matches the data type of the field.

When Continue is depressed, the list contains all applicable functions of the available synchronous network device configured in the system **100**. If the preceding output does not match the input to a function, it cannot be applied and does not appear on the list.

The following notation is used for the functions:

SISName.FunctionName(InputFieldName: InputFieldDataType)→(OutputFieldName:OutputFieldDataType)

When the function has multiple input and/or output arguments, the notation reflects this. The arguments are separated by commas.

The following example shows a field enhancement.

DNS.Address(Host Name:String)→(IP Address:IP Address)

Where DNS is the name of the synchronous ISM (or network device) as it appears in the system configuration.

Address is the name of the function.

(Host Name:String) is the input to the function—host FQDN of data type String

(IP Address:IP Address) is the output—IP address of data type IP Address

The NSP can define the field enhancement by choosing items from the list. The list contains the option <none> when the End button is depressed. Choosing this option has the same effect as not defining a field enhancement: no data from the trigger will be stored in the field in the central database **175**.

E. Record Merges

FIG. **5** illustrates an example record merge. Record merging removes duplicate records from the central database **175**.

The following example shows how merges work and illustrates the need for merging duplicate records. Suppose the system **100** is using two asynchronous ISMs **110** and **130**. All outbound network traffic going through the proxy server **101** is routed through the firewall **103**. The firewall **103** records the proxy server **101** as the source of all sessions passing through the proxy server **101**, although they originate from different workstations on the network. At the same time, the proxy server **101** records the destination of all sessions as the firewall **103**, although their actual destinations are the different Internet sites.

Therefore, all sessions are logged twice by the system **100** and the records are skewed. The data from the firewall **103** indicates the destination of a given session, but not the source (see data record **520**), while the data from the proxy server **101** records the source, but not the destination (see data record **510**). Defining a merge eliminates the duplication of records.

A merge can be defined instructing the CEM **170** to store the destination data obtained from the firewall **103** and the source data from the proxy server **101** in the central database **175**. The merge will also eliminate the problem of skewed data by storing the correct source and destination of the session in the central database **175**. Both network devices provide information on the URL. The latter can be used to identify the fact that the two seemingly independent records (**510** and **520**) are actually two logs of the same session.

Two enhancement procedures are defined for the example of FIG. **5**. The trigger of the first, designated Flow One, is the Proxy Server Asynchronous Information Source Module. The trigger of the second, Flow Two, is the Firewall Asynchronous Information Source Module. The records from Flow One and Flow Two are records of the same session. They both have the same value for the URL field. Based on this value, the CEM **170** identifies the two records are double logs of the same session. It merges the two data records taking the Source IP value from Flow One and the Destination IP from Flow Two as the values to be stored in the central database **175**.

Defining Merges

The following describes defining merges. A merge is a set of rules that specify how duplicate records from multiple enhancement procedures must be identified and combined before being stored in the central database **175**. The NSP can merge the records from two or more enhancement procedures. To define a merge, the NSP identifies the following information.

The enhancement procedures included in the merge.

How to identify duplicate records (which fields of the records must match).

How to combine the records; that is, for each field, which value (from which enhancement procedure) must be stored in the central database **175**. (Optional)

If the NSP does not specify how records must be combined, the records are merged as follows:

When the values in all but one of the fields are null, the non-null value is stored.

When the fields contain non-null values, the value of the first record received (chronologically) is stored.

F. Additional Embodiments

The following describes additional embodiments of the invention.

In some embodiments, the user interface used by an NSP to configure the system **100** can be presented as a graphical representation of the data enhancement process. Every step in the enhancement can be shown as a block joined to another block (or icon or some graphical representation). The properties of a block define the operations within the block. In some embodiments, the entire data enhancement process from network devices to the central database **175** can be shown by linked graphics where the properties of a graphic are the properties of the enhancement at that stage.

In some embodiments, multiple CEMs **170** and/or central databases **175** can be used as data sources (back ends) for datamart or other databases or applications (e.g., customer care and billing systems).

In some embodiments, the types of databases used are not necessarily relational. Object databases or other databases can be used.

In some embodiments, other platforms are used. Although the above description of the system **100** has been IP network focussed with Unix or Windows NT systems supporting the elements, other networks (non-IP networks) and computer platforms can be used. What is important is that some sort of processing and storing capability is available at the gatherers, the CEMs, the databases, and the user interface servers.

In some embodiments, the gatherers and other elements of the system **100**, can be remotely configured, while in other embodiments, some of the elements need to be configured directly. For example, a gatherer may not be remotely configurable, in which case, the NSP must interface directly with the computer running the gatherer.

In other embodiments, the general ideas described herein can be applied to other distributed data enhancement problems. For example, some embodiments of the invention could be used to perform data source extraction and data preparation for data warehousing applications. The gatherers would interface with ISMs that are designed to extract data from databases (or other data sources). The gatherers would

perform filtering and aggregation depending upon the needs of the datamart (in such an embodiment, the central database and CEM could be replaced with/used with a datamart). The data enhancement would then be done before storing the information in the datamart.

FIG. **6** illustrates a system **600** where multiple systems **100** are linked together. This system could be an ISPs point of presence accounting system. The system **620** and the system **610** can store detailed network accounting information in their local detailed accounting databases. This information can then be aggregated and sent over the more expensive long distance links to the billing database in the system **630**. Customer service information can still be accessed at the detailed accounting database, but the aggregated information may be all that is needed to create the bills.

Additional embodiments of the invention are described in the attached appendices A–F.

G. Conclusions

A network accounting and billing system and method has been described. In some embodiments, the system can access any network related information sources such as traffic statistics provided by routers and switching hubs as well as application server access logs. These are accumulated in a central database for creating auditing, accounting and billing reports. Because of the distributed architecture, filtering and enhancements, the system efficiently and accurately collects the network usage information for storage in a form that is useful for billing and accounting.

What is claimed is:

1. A method for reporting on the collection of network usage information from a plurality of network devices, comprising:

(a) collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers utilizing multiple gatherers each including a plurality of information source modules each interfacing with one of the network devices and capable of communicating using a protocol specific to the network device coupled thereto, the network devices selected from the group consisting of routers, switches, firewalls, authentication servers, web hosts, proxy servers, netflow servers, databases, mail servers, RADIUS servers, and domain name servers, the gatherers being positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network;

(b) filtering and aggregating the network communications usage information;

(c) completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;

(d) storing the plurality of data records in a database;

(e) allowing the selection of one of a plurality of reports for reporting purposes;

(f) submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices; and

(g) outputting a report based on the queries.

2. A method as recited in claim **1**, and further comprising submitting network activity queries to the database utilizing the selected reports for retrieving information on activity of the network.

3. A method as recited in claim **2**, and further comprising outputting a network activity report based on the network activity queries.

4. A method as recited in claim **1**, and further comprising submitting resource consumption queries to the database utilizing the selected reports for retrieving information on resource consumption in the network.

5. A method as recited in claim **2**, and further comprising outputting a resource consumption report based on the resource consumption queries.

6. A method as recited in claim **2**, and further comprising generating an alert upon the occurrence of an event.

7. A method as recited in claim **6**, wherein the alert is generated upon a value surpassing a predetermined amount.

8. A method as recited in claim **6**, wherein the alert indicates that services should be ceased.

9. A method as recited in claim **6**, wherein the alert indicates that services should be provided.

10. A method as recited in claim **1**, wherein the report includes an auditing report.

11. A method as recited in claim **1**, wherein the report includes a billing report.

12. A method as recited in claim **1**, wherein the report includes an accounting report.

13. A computer program product embedded into computer readable medium for reporting on the collection of network usage information from a plurality of network devices, comprising:

(a) computer code for collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers utilizing multiple gatherers each including a plurality of information source modules each interfacing with one of the network devices and capable of communicating using a protocol specific to the network device coupled thereto, the network devices selected from the group consisting of routers, switches, firewalls, authentication servers, web hosts, proxy servers, netflow servers, databases, mail servers, RADIUS servers, and domain name servers, the gatherers being positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network;

(b) computer code for filtering and aggregating the network communications usage information;

(c) computer code for completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;

(d) computer code for storing the plurality of data records in a database;

(e) computer code for allowing the selection of one of a plurality of reports for reporting purposes;

(f) computer code for submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices; and

(g) computer code for outputting a report based on the queries.

14. A system comprising computer readable medium for reporting on the collection of network usage information from a plurality of network devices, comprising:

(a) information source modules for collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers

utilizing multiple gatherers each including a plurality of information source modules each interfacing with one of the network devices and capable of communicating using a protocol specific to the network device coupled thereto, the network devices selected from the group consisting of routers, switches, firewalls, authentication servers, web hosts, proxy servers, netflow servers, databases, mail servers, RADIUS servers, and domain name servers, the gatherers being positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network;

(b) gatherers coupled to the information modules, the gatherers adapted for filtering and aggregating the network communications usage information;

(c) a central event manager coupled to the gatherers, the central event manager adapted for completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;

(d) a database coupled to the central event manager, the database adapted for storing the plurality of data records;

(e) logic for allowing the selection of one of a plurality of reports for reporting purposes, submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices, outputting a report based on the queries.

15. A method for reporting on the collection of network usage information from a plurality of network devices, comprising:

(a) collecting network communications usage information in real-time from network devices at a plurality of layers utilizing multiple gatherers each including a plurality of information source modules each interfacing with one of the network devices and capable of communicating using a protocol specific to the network device coupled thereto, the network devices selected from the group consisting of routers, switches, firewalls, authentication servers, web hosts, proxy servers, netflow servers, databases, mail servers, RADIUS servers, and domain name servers, the gatherers being positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network;

(b) translating the network communications usage information collected from the network devices utilizing the information source modules;

(c) caching the network communications usage information collected from the network devices utilizing the gatherers;

(d) normalizing the network communications usage information with the gatherers by excluding fields not required by a central event manager coupled to the gatherers;

(e) defining an enhancement procedure utilizing the central event manager;

(f) coordinating the collection of the network communications usage information by the gatherers utilizing the central event manager;

(g) filtering the network communications usage information utilizing the central event manager;

(h) completing a plurality of data records from the filtered network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;

(i) aggregating the network communications usage information and the data records utilizing the central event manager for reducing a number of the data records;

(j) enhancing the aggregation of the network communications usage information with the gatherers in accordance with the defined enhancement procedure;

(k) time stamping the data records;

(l) storing the time stamped data records in tables in a central database coupled to the central event manager at a user-specified interval;

(m) deleting the stored data records upon the cessation of a predetermined amount of time after the storage utilizing the timestamp;

(n) periodically determining whether the network devices are currently licensed;

(o) submitting network activity queries to the central database for retrieving information on activity of the network;

(p) outputting a network activity report based on the network activity queries;

(q) submitting resource consumption queries to the central database for retrieving information on resource consumption in the network;

(r) outputting a resource consumption report based on the resource consumption queries; and

(s) generating an alert upon the occurrence of an event utilizing the information source modules.

16. A method as recited in claim **15**, wherein the alert is generated upon a value surpassing a predetermined amount.

17. A method as recited in claim **15**, wherein the alert indicates that services should be ceased.

18. A method as recited in claim **15**, Wherein the alert indicates that services should be provided.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.	: 6,947,984 B2
APPLICATION NO.	: 09/935129
DATED	: September 20, 2005
INVENTOR(S)	: Schweitzer et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Claim 14, col. 17, line 13; insert --source-- before “modules” and after “information”;
Claim 14, col. 17, line 24; replace “records;” with --records; and--;
Claim 14, col. 17, line 29; replace “devices, outputting” with --devices, and outputting--.

Signed and Sealed this
Nineteenth Day of March, 2013

Teresa Stanek Rea
Acting Director of the United States Patent and Trademark Office

US007412510B2

(12) **United States Patent**
Schweitzer et al.

(10) **Patent No.: US 7,412,510 B2**
(45) **Date of Patent: *Aug. 12, 2008**

(54) **SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR REPORTING ON THE COLLECTION OF NETWORK USAGE INFORMATION**

(75) Inventors: **Limor Schweitzer**, Santa Clara, CA (US); **Eran Wagner**, Cupertino, CA (US); **Tal Givoly**, Cupertino, CA (US)

(73) Assignee: **Amdocs (Israel) Ltd.**, Ra'anana (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 136 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **11/058,956**

(22) Filed: **Feb. 15, 2005**

(65) **Prior Publication Data**

US 2005/0138163 A1 Jun. 23, 2005

Related U.S. Application Data

(63) Continuation of application No. 09/935,129, filed on Aug. 21, 2001, now Pat. No. 6,947,984, which is a continuation of application No. 09/442,876, filed as application No. PCT/US98/24963 on Nov. 20, 1998, now Pat. No. 6,418,467.

(60) Provisional application No. 60/066,898, filed on Nov. 20, 1997, provisional application No. 60/109,095, filed on Nov. 19, 1998.

(51) **Int. Cl.**
G06F 13/00 (2006.01)

(52) **U.S. Cl.** **709/224**

(58) **Field of Classification Search** 709/200, 709/223, 224; 379/111
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,491,725 A		1/1985	Pritchard	235/375
4,750,201 A		6/1988	Hodgson et al.	379/144
4,883,948 A		11/1989	Sunyich	235/382
5,627,886 A	*	5/1997	Bowman	379/111
5,852,818 A	*	12/1998	Guay et al.	707/1
5,905,715 A	*	5/1999	Azarmi et al.	370/244
6,011,838 A	*	1/2000	Cox	379/112.06
6,101,170 A	*	8/2000	Doherty et al.	370/255
6,104,711 A	*	8/2000	Voit	370/352
6,189,101 B1	*	2/2001	Dusenbury, Jr.	726/2

(Continued)

FOREIGN PATENT DOCUMENTS

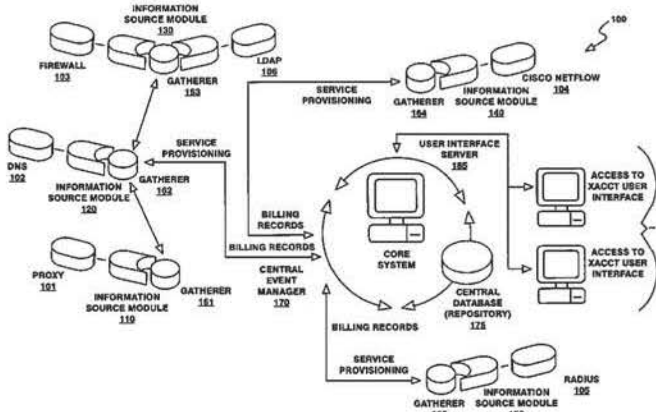
WO WO 91/03023 3/1991

Primary Examiner—Robert B Harrell
(74) *Attorney, Agent, or Firm*—Zilka-Kotab, PC

(57) **ABSTRACT**

In some embodiments, network traffic information is captured at network information sources. These sources provide detailed information about the network communications transactions at a network device. Importantly, different types of sources can provide different types of information. Gatherer devices gather the detailed information from the various information source devices and convert the information into standardized information. The gatherer devices can correlate the gathered information with account information for network transaction accounting. Manager devices manage the gatherer devices and store the gathered standardized information. The manager devices eliminate duplicate network information that may exist in the standardized information. The manager devices also consolidate the information. Importantly, the information stored by the manager devices represents the consolidated, account correlated, network transaction information that can be used for billing or network accounting. The system thereby provides a distributed network accounting and billing system.

21 Claims, 7 Drawing Sheets



U.S. PATENT DOCUMENTS

6,208,720 B1 * 3/2001 Curtis et al. 379/114.14
6,243,667 B1 * 6/2001 Kerr et al. 703/27
6,452,925 B1 * 9/2002 Sistanizadeh et al. 370/352
6,601,048 B1 * 7/2003 Gavan et al. 706/10
6,650,639 B2 * 11/2003 Doherty et al. 370/389
6,658,465 B1 * 12/2003 Touboul 709/223
6,751,738 B2 * 6/2004 Wesinger et al. 726/14
7,058,600 B1 * 6/2006 Combar et al. 705/34

* cited by examiner

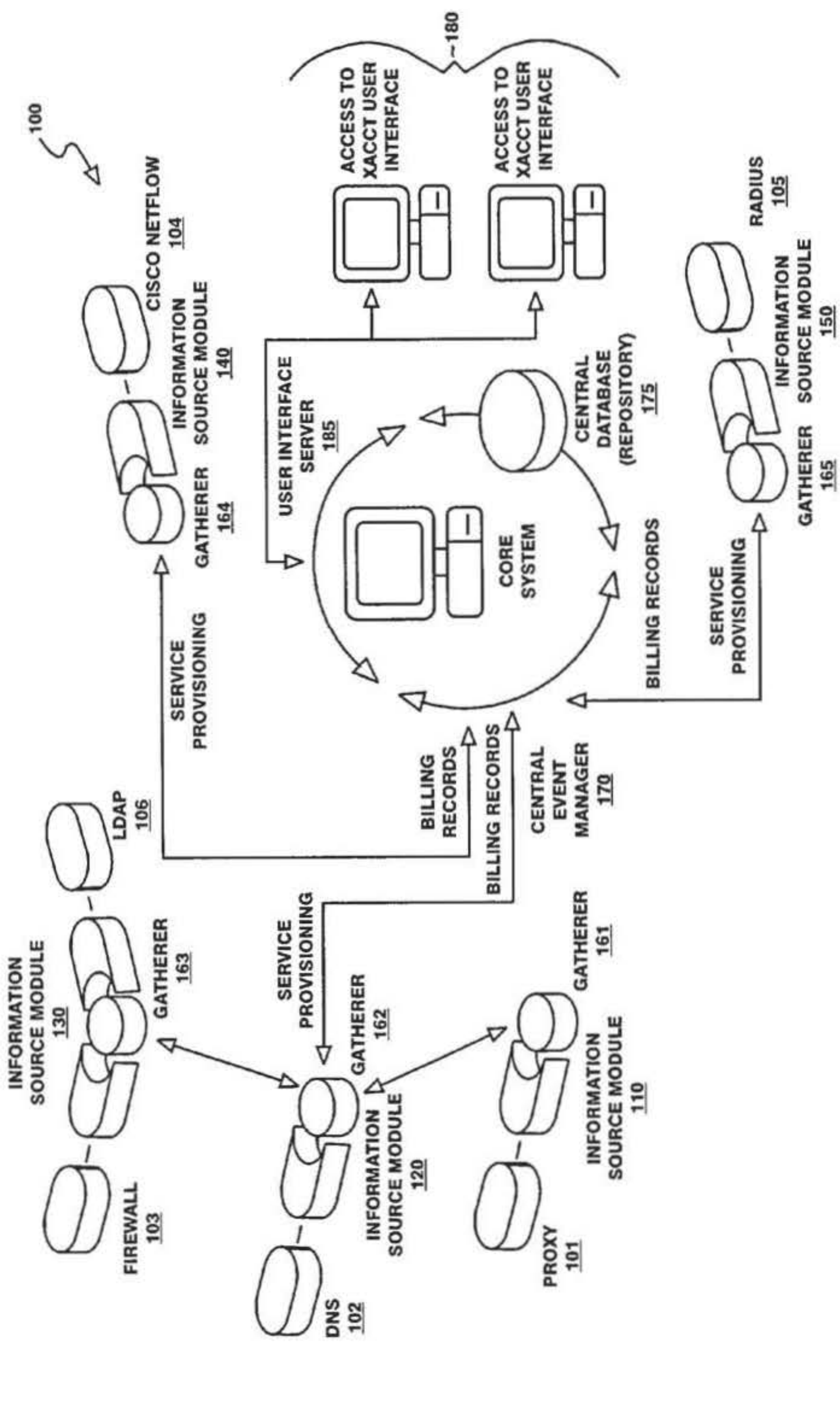

100
CISCO NETFLOW 104
INFORMATION SOURCE MODULE 140
GATHERER 164
SERVICE PROVISIONING
LDAP 106
INFORMATION SOURCE MODULE 130
GATHERER 163
FIREWALL 103
DNS 102
INFORMATION SOURCE MODULE 120
GATHERER 162
SERVICE PROVISIONING
BILLING RECORDS
BILLING RECORDS
CENTRAL EVENT MANAGER 170
PROXY 101
INFORMATION SOURCE MODULE 110
GATHERER 161
USER INTERFACE SERVER 185
CORE SYSTEM
CENTRAL DATABASE (REPOSITORY) 175
BILLING RECORDS
SERVICE PROVISIONING
ACCESS TO XACCT USER INTERFACE
ACCESS TO XACCT USER INTERFACE
180
RADIUS 105
INFORMATION SOURCE MODULE 150
GATHERER 165

FIG. 1

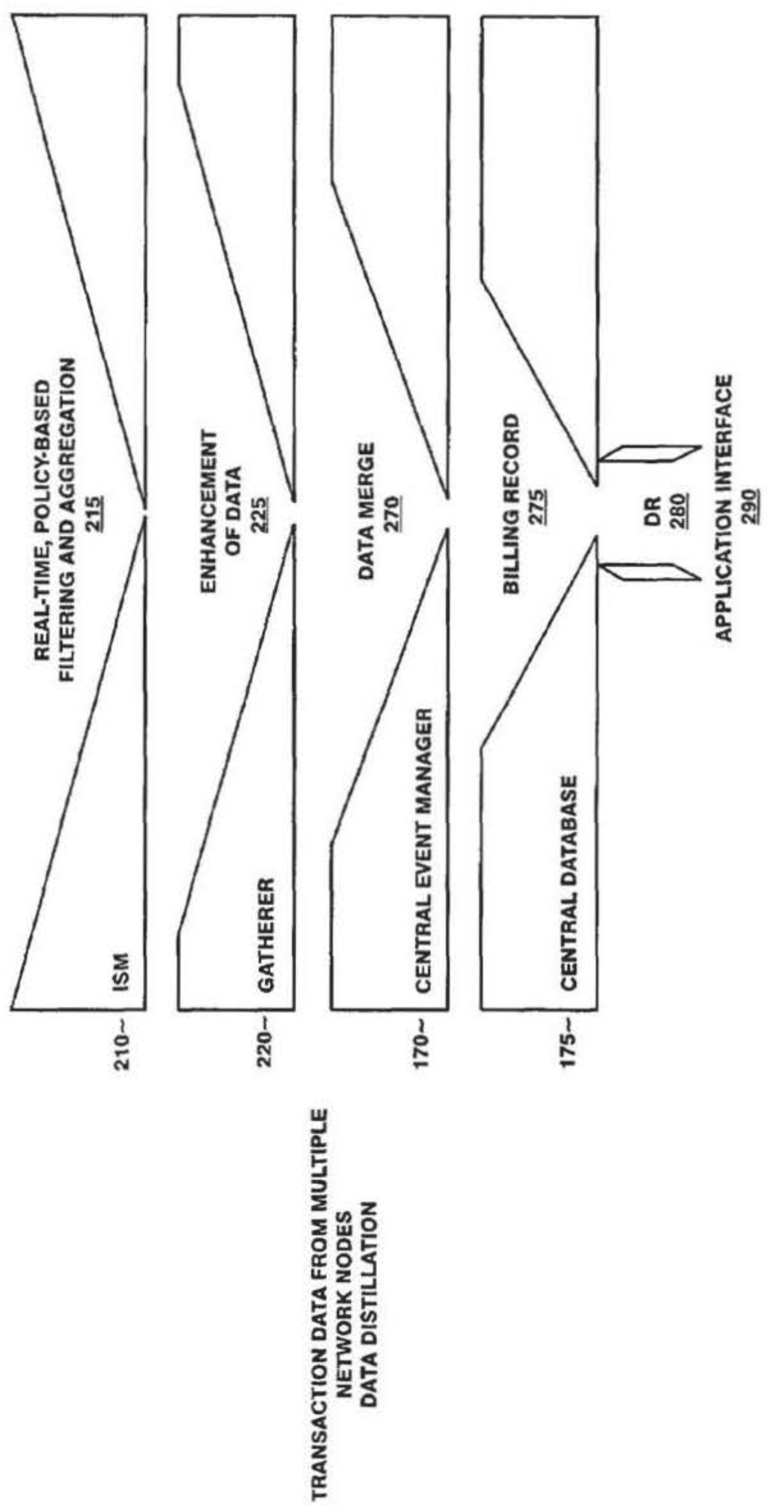

REAL-TIME, POLICY-BASED FILTERING AND AGGREGATION 215
ENHANCEMENT OF DATA 225
DATA MERGE 270
BILLING RECORD 275
DR 280
APPLICATION INTERFACE 290
ISM
GATHERER
CENTRAL EVENT MANAGER
CENTRAL DATABASE
210
220
170
175
TRANSACTION DATA FROM MULTIPLE NETWORK NODES DATA DISTILLATION

FIG. 2

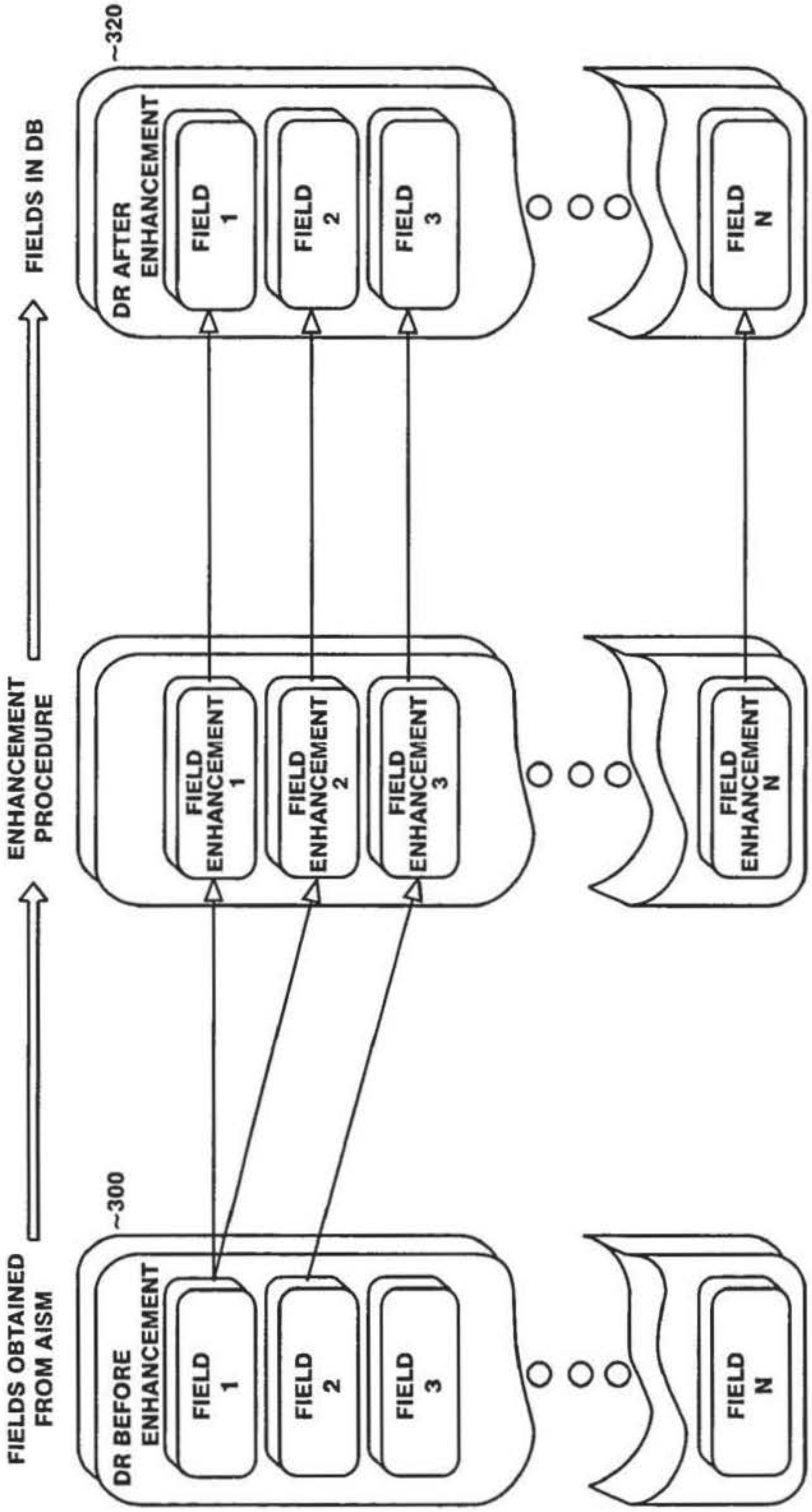

FIELDS OBTAINED FROM AISM
ENHANCEMENT PROCEDURE
FIELDS IN DB
~300
DR BEFORE ENHANCEMENT
FIELD 1
FIELD 2
FIELD 3
FIELD N
FIELD ENHANCEMENT 1
FIELD ENHANCEMENT 2
FIELD ENHANCEMENT 3
FIELD ENHANCEMENT N
~320
DR AFTER ENHANCEMENT
FIELD 1
FIELD 2
FIELD 3
FIELD N

FIG. 3

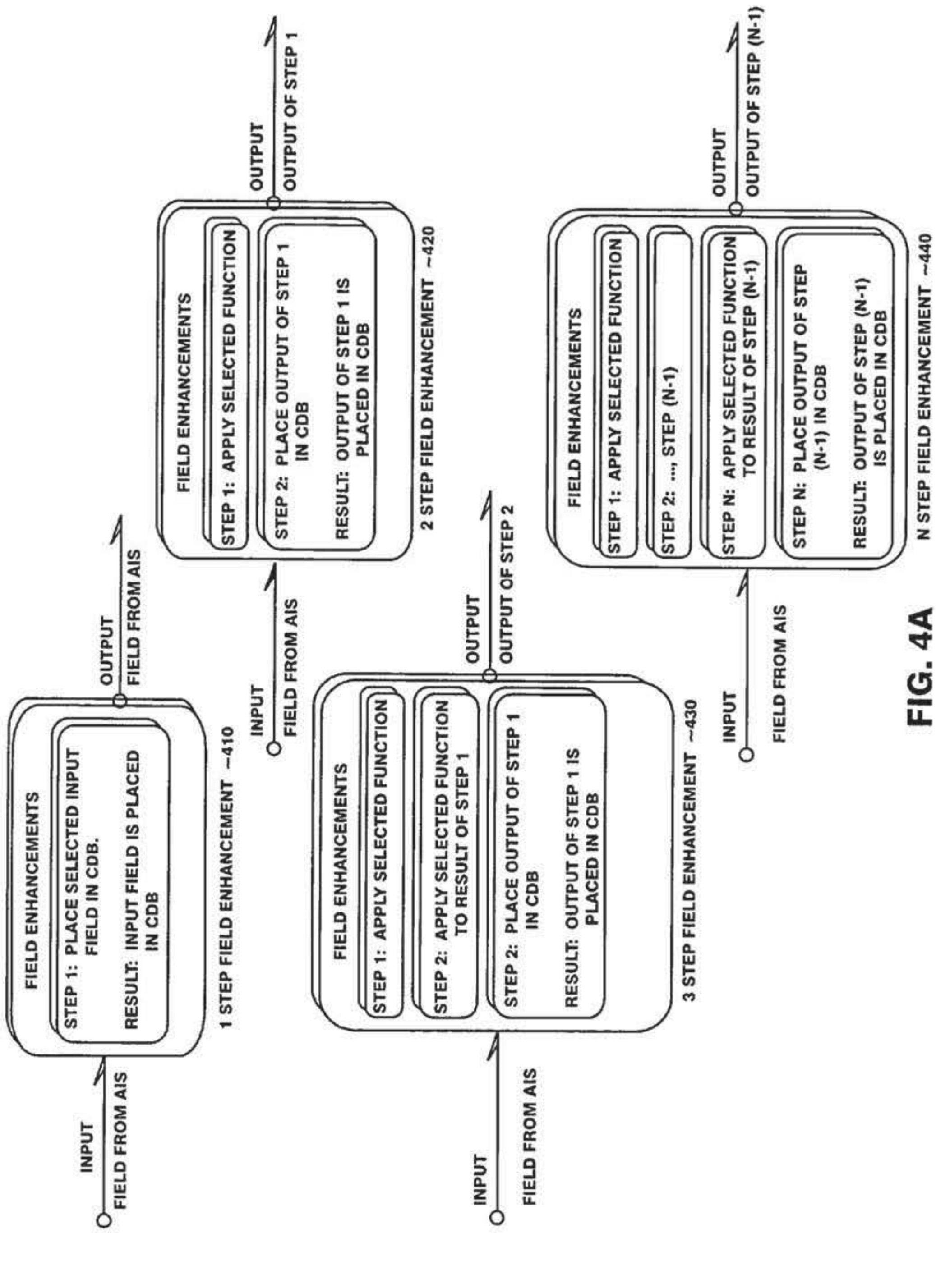

INPUT
FIELD FROM AIS
FIELD ENHANCEMENTS
STEP 1: PLACE SELECTED INPUT FIELD IN CDB.
RESULT: INPUT FIELD IS PLACED IN CDB
1 STEP FIELD ENHANCEMENT ~410
OUTPUT
FIELD FROM AIS
INPUT
FIELD FROM AIS
FIELD ENHANCEMENTS
STEP 1: APPLY SELECTED FUNCTION
STEP 2: PLACE OUTPUT OF STEP 1 IN CDB
RESULT: OUTPUT OF STEP 1 IS PLACED IN CDB
2 STEP FIELD ENHANCEMENT ~420
OUTPUT
OUTPUT OF STEP 1
INPUT
FIELD FROM AIS
FIELD ENHANCEMENTS
STEP 1: APPLY SELECTED FUNCTION
STEP 2: APPLY SELECTED FUNCTION TO RESULT OF STEP 1
STEP 2: PLACE OUTPUT OF STEP 1 IN CDB
RESULT: OUTPUT OF STEP 1 IS PLACED IN CDB
3 STEP FIELD ENHANCEMENT ~430
OUTPUT
OUTPUT OF STEP 2
INPUT
FIELD FROM AIS
FIELD ENHANCEMENTS
STEP 1: APPLY SELECTED FUNCTION
STEP 2: ..., STEP (N-1)
STEP N: APPLY SELECTED FUNCTION TO RESULT OF STEP (N-1)
STEP N: PLACE OUTPUT OF STEP (N-1) IN CDB
RESULT: OUTPUT OF STEP (N-1) IS PLACED IN CDB
N STEP FIELD ENHANCEMENT ~440
OUTPUT
OUTPUT OF STEP (N-1)

FIG. 4A

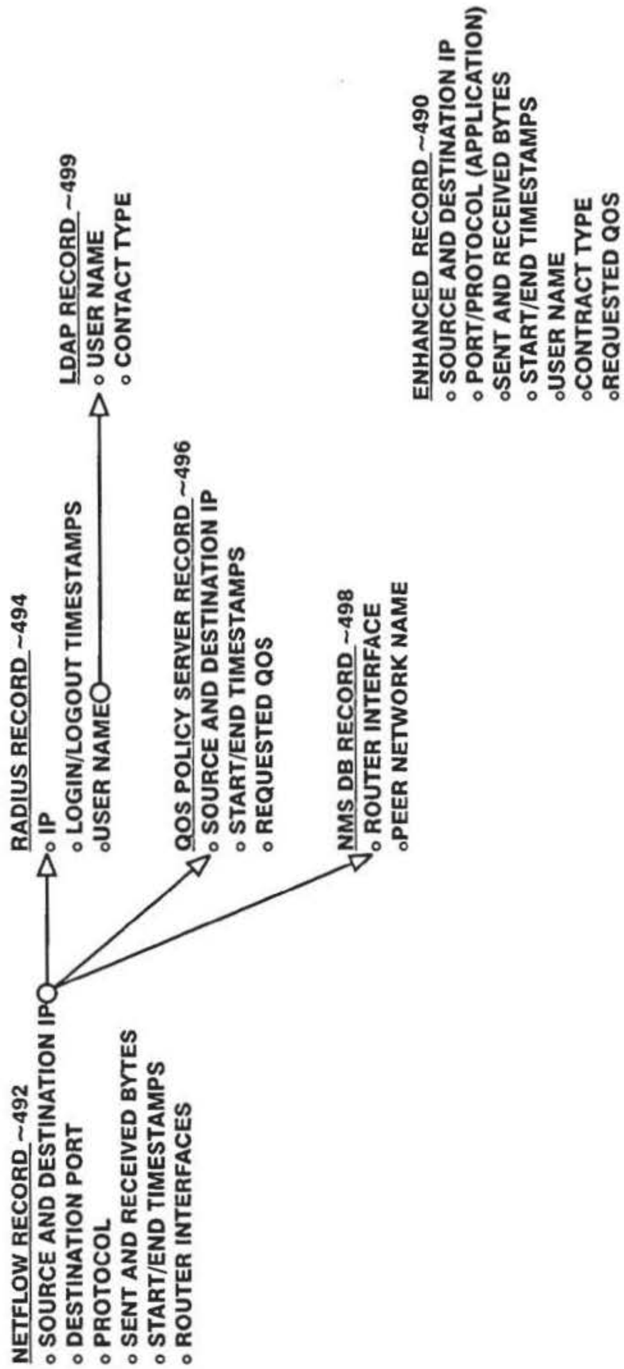

NETFLOW RECORD ~492
SOURCE AND DESTINATION IP
DESTINATION PORT
PROTOCOL
SENT AND RECEIVED BYTES
START/END TIMESTAMPS
ROUTER INTERFACES
RADIUS RECORD ~494
IP
LOGIN/LOGOUT TIMESTAMPS
USER NAME
QOS POLICY SERVER RECORD ~496
SOURCE AND DESTINATION IP
START/END TIMESTAMPS
REQUESTED QOS
NMS DB RECORD ~498
ROUTER INTERFACE
PEER NETWORK NAME
LDAP RECORD ~499
USER NAME
CONTACT TYPE
ENHANCED RECORD ~490
SOURCE AND DESTINATION IP
PORT/PROTOCOL (APPLICATION)
SENT AND RECEIVED BYTES
START/END TIMESTAMPS
USER NAME
CONTRACT TYPE
REQUESTED QOS

FIG. 4B

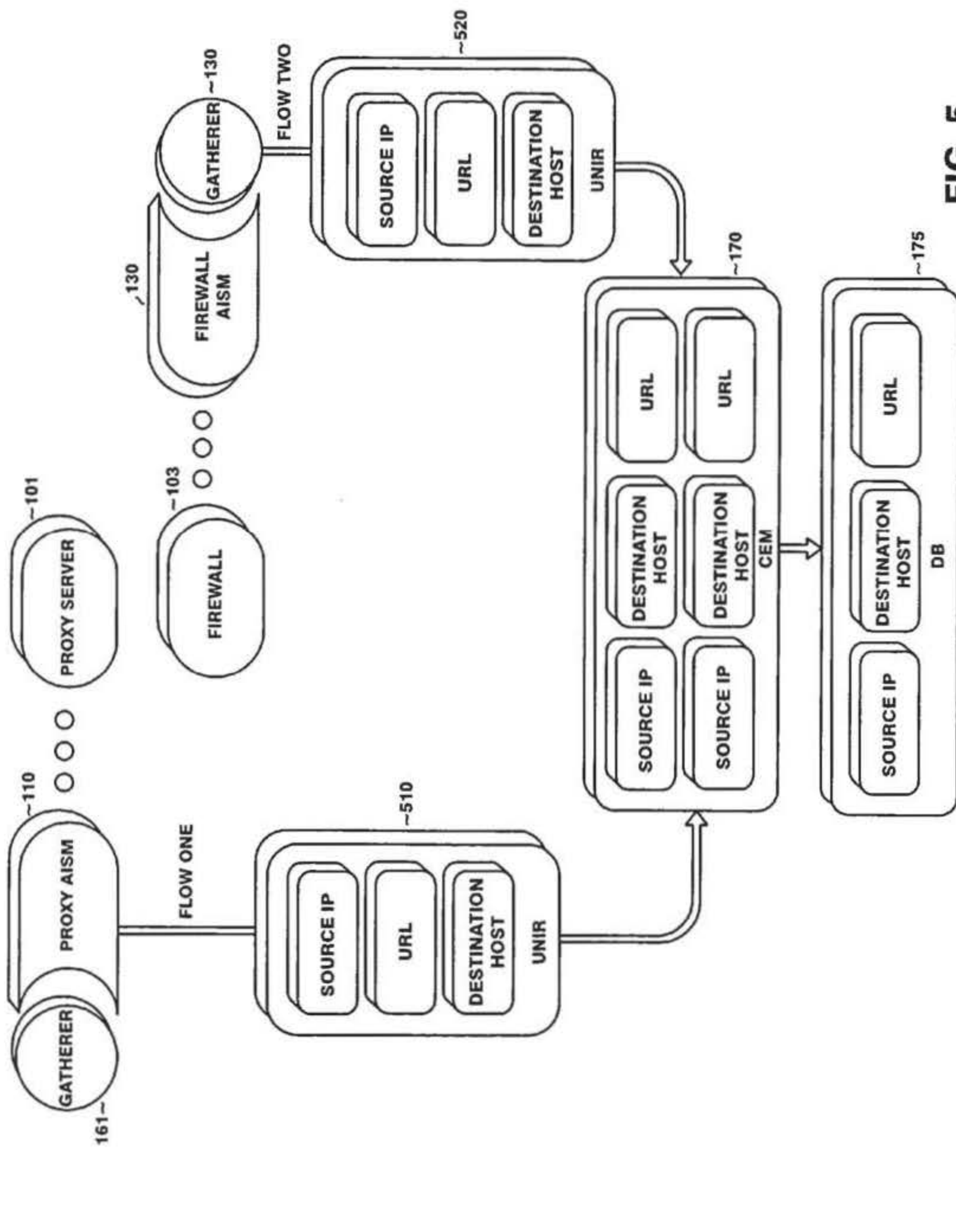

GATHERER
161
PROXY AISM
110
FLOW ONE
PROXY SERVER
101
FIREWALL
103
FIREWALL AISM
130
GATHERER
130
FLOW TWO
510
SOURCE IP
URL
DESTINATION HOST
UNIR
520
SOURCE IP
URL
DESTINATION HOST
UNIR
170
SOURCE IP
DESTINATION HOST
URL
SOURCE IP
DESTINATION HOST
URL
CEM
175
SOURCE IP
DESTINATION HOST
URL
DB

FIG. 5

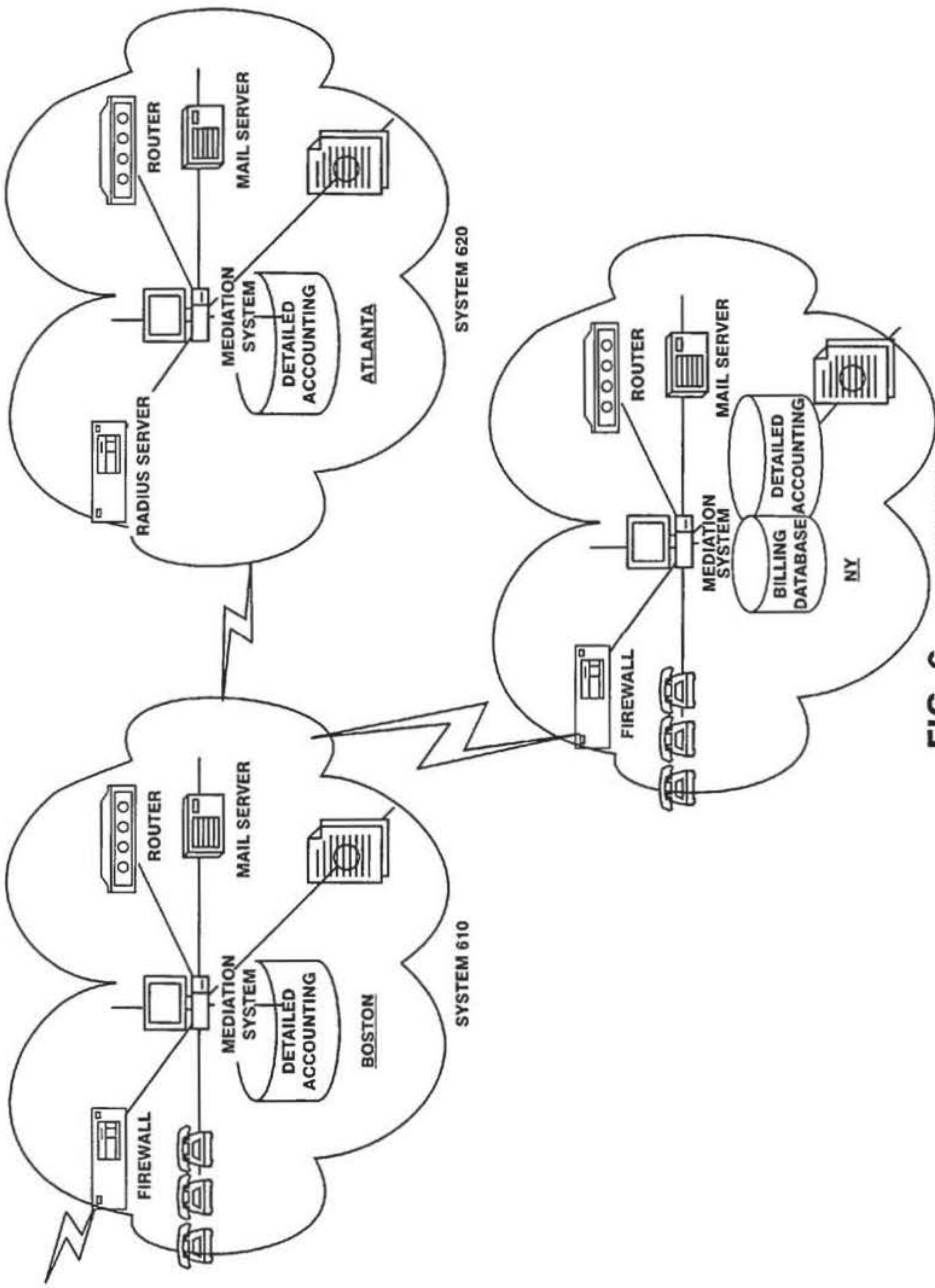

ROUTER
MAIL SERVER
MEDIATION SYSTEM
DETAILED ACCOUNTING
ATLANTA
RADIUS SERVER
SYSTEM 620
ROUTER
MAIL SERVER
MEDIATION SYSTEM
DETAILED ACCOUNTING
BILLING DATABASE
NY
FIREWALL
SYSTEM 630
ROUTER
MAIL SERVER
MEDIATION SYSTEM
DETAILED ACCOUNTING
BOSTON
FIREWALL
SYSTEM 610

FIG. 6

SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR REPORTING ON THE COLLECTION OF NETWORK USAGE INFORMATION

The present application is a continuation of U.S. Ser. No. 09/935,129 now U.S. Pat. No. 6,947,984 entitled "SYSTEM. METHOD AND COMPUTER PROGRAM PRODUCT FOR REPORTING IN A NETWORK-BASED FILTERING AND AGGREGATING PLATFORM", filed Aug. 21, 2001 issued Sep. 20, 2005, which is a continuation of Ser. No. 09/442,876 now U.S. Pat. No. 6,418,467 entitled "NETWORK ACCOUNTING AND BILLING SYSTEM AND METHOD", filed Nov. 18, 1999 issued Jul. 9, 2002, which claims priority to a PCT application filed Nov. 20, 1998 under serial number PCT/US98/24963 entitled "NETWORK ACCOUNTING AND BILLING SYSTEM AND METHOD", a first provisional patent application filed Nov. 20,1997 under Ser. No. 60/066,898, and a second provisional patent application filed Nov. 19, 1998 under Ser. No. 60/109, 095.

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BACKGROUND OF THE INVENTION

A. Field of the Invention

This invention relates to the field of computer networks. In particular, the invention relates to accounting and billing for services in a computer network.

B. Description of the Related Art

The low cost of Internet connectivity and a wide range of services are driving and more people onto the Internet, which is driving the deployment of TCP/IP networks. This process has led to a new market of client-server applications that enables the user to interact with other users and computer systems around the world. The use of these applications is consuming more and more Intranet and Internet bandwidth.

New applications such as "voice over IP (Internet Protocol)" and streaming audio and video require even more bandwidth and a different quality of service than email, or other less real-time applications. Also, the type quality of service can vary according to the needs of the user. For example, typically, businesses do not tolerate unavailable network services as easily as consumers. Internet Service Providers (ISPs) therefore would like to price their available bandwidth according to a user's needs. For example, flat monthly pricing may be the best billing model for consumers, but businesses may want to be billed according to their used bandwidth at particular qualities of service.

As ISPs continue to differentiate themselves by providing additional services, enterprise information technology managers will face similar problems to account for the escalating Intranet operating costs.

Therefore, ISPs and enterprise information technology managers will want to account for session logging, bandwidth usage, directory data and application session information from a variety of sources.

Due to the diversity of IP data sources (e.g., routers, hubs etc.), the need for effect tracking far exceeds the problems addressed by telephone companies. Telephone companies track information such as circuit usage so it can be correlated with account information. For example, businesses may use leased lines, consumers may have "Friends and Family" plans, cellular phones have different roamer fees according to the location of the user, etc. Typically, the phone company captures all of the data and uses batch processing to aggregate the information into specific user accounts. For example, all the long distance calls made during a billing period are typically correlated with the Friends and Family list for each phone account at the end of a billing period for that account. This requires a significant amount of computing power. However, this type of problem is significantly simpler than attempting to track and bill for every transaction in an IP network. Therefore, what is desired is a system that allows for accounting and billing of transactions on IP based networks.

The problem is even more difficult in IP network traffic because the information sources can exist and many different levels of the OSI network model, throughout heterogeneous networks. Potential sources of information include packet use from routers, firewall authentication logging, email data, ISP session logging, and application layer use information. Therefore, what is desired is a system and method that track IP network usage information across multiple layers of the OSI network model.

SUMMARY OF THE INVENTION

A network accounting and billing system and method are described. In some embodiments, the system can access any network related information sources such as traffic statistics provided by routers and switching hubs as well as application server access logs. The information can be accumulated in a central database for creating auditing, accounting and billing reports. Alternatively, the information can be sent directly to other systems such as rating engines used in customer care and billing systems.

In one embodiment, network traffic information is captured at network information sources (examples of information sources include network devices). These sources provide detailed information about the network communications transactions at a network device. Importantly, different types of sources can provide different types of information. Gatherer devices gather the detailed information from the various information source devices and convert the information into standardized information. The gatherer devices can correlate the gathered information with account information for network transaction accounting. Manager devices manage the gatherer devices and store the gathered standardized information. The manager devices eliminate duplicate network information that may exist in the standardized information. The manager devices also consolidate the information. Importantly, the information stored by the manager devices represents the consolidated, account correlated, network transaction information used for billing. In addition to account information, transaction information can be correlated to other information such as geography information (e.g., the location of an accessed server) and/or transaction routing information (as may be used in peering agreements between Internet Service Providers). The system thereby provides a distributed network accounting and billing system.

In some embodiments, the gatherer devices can access sources through proxy gateways, firewalls, and/or address translation barriers.

In some embodiments, the gatherer devices can correlate the information about a specific transaction with a particular account by accessing the transaction's source and/or destina-

tion information. The source and/or destination information is then correlated with account information from an account information database.

BRIEF DESCRIPTION OF THE FIGURES

The figures illustrate the invention by way of example. The invention is not meant to be limited to only those embodiments of shown in the Figures. The same reference in different figures indicates the same element is being used in those figures.

FIG. **1** illustrates a system including one embodiment of the invention.

FIG. **2** illustrates an example of the data distillation used in the system of FIG. **1**.

FIG. **3** illustrates data enhancements used in the data distillation.

FIG. **4**A illustrates example field enhancements that can be included in the data enhancements.

FIG. **4**B illustrates the creation of an enhanced record.

FIG. **5** illustrates an example record merge.

FIG. **6** illustrates an example of an alternative embodiment of the system.

DETAILED DESCRIPTION

A. System Overview

One embodiment of the system includes a multi-source, multi-layer network usage metering and mediation solution that gives Network Service Providers (NSPs), including Internet Service Providers (ISPs) and enterprise network(Intranet) operators, the information needed to set the right-price for IP (Internet Protocol) services. With the system, the providers can generate accurate usage-based billing and implement usage-based charge-back models. The system derives LP session and transaction information, collected in real time, from a multitude of network elements. The system gathers, correlates, and transforms data from routers, switches, firewalls, authentication servers, LDAP, Web hosts, DNS, and other devices to create comprehensive usage and billing records.

The system transforms raw transaction data from network devices into useful billing records though policy-based filtering, aggregation, and merging. The result is a set of detail records (DRs). In some embodiments, the detail records are XaCCT Detail Records (XDRs™) available from XaCCT Technologies. DRs are somewhat similar in concept to the telephony industry's Call Detail Records (CDRs). Thus, DRs can be easily integrated with existing Customer Care and Billing (CCB) systems.

In addition to billing data, DRs enable NSPs to deploy new services based on documented usage trends, plan network resource provisioning, and audit service usage. The system provides a clear picture of user-level network service use by tracking a variety of metrics such as actual session Quality of Service (QoS),traffic routes, and end-user application transactions.

The system is based on a modular, distributed, highly scalable architecture capable of running on multiple platforms. Data collection and management is designed for efficiency to minimize impact on the network and system resources.

The system minimizes network impact by collecting and processing data close to its source. Modular architecture provides maximum configuration flexibility, and compatibility with multiple network information sources.

The system, or other embodiments, may have one or more of the following features.

Data collection can be from a wide range of network devices and services, spanning all layers of the network—from the physical layer to the application layer.

Real-time, policy-based filtering, aggregation, enhancement and merging creates accurate, detailed and comprehensive session detail records (DRs).

Real time correlation of data from various sources allows billing record enhancement.

Leverages existing investment through integration with any customer care & billing solution, reducing costs, minimizing risks and shortened time-to-market.

Non-intrusive operation eliminates any disruption of network elements or services.

Web-based user interface allows off-the-shelf browsers to access the system, on-demand, locally or remotely.

Carrier-class scalability allows expansion to fit an NSPs needs without costly reconfiguration.

Distributed filtering and aggregation eliminates system capacity bottlenecks.

Efficient, centralized system administration allows on-the-fly system reconfigurations and field upgrades.

Customized reporting with built-in report generation or an NSPs choice of off-the-shelf graphical reporting packages.

Comprehensive network security features allow secure communication between system components and multiple levels of restricted access.

B. System Details

The following describes the system **100** of FIG. **1**. The system **100** allows NSPs to account for and bill for IP network communications. The following paragraphs first list the elements of FIG. **1**, then describes those elements and then describes how the elements work together. Importantly, the distributed data gathering, filtering and enhancements performed in the system **100** enables load distribution. Granular data can reside in the peripheries of the system **100**, close to the information sources. This helps avoids reduce congestion in network bottlenecks but still allows the data to be accessible from a central location. In previous systems, all the network information flows to one location, making it very difficult to keep up with the massive record flows from the network devices and requiring huge databases.

The following lists the elements of FIG. **1**. FIG. **1** includes a number of information source modules (ISMs) including an ISM **110**, an ISM **120**, an ISM **130**, an ISM **136**, an ISM **140**, and an ISM **150**. The system also includes a number of network devices, such as a proxy server **101**, a DNS **102**, a firewall **103**, an LDAP **106**, a CISCO® NetFlow **104**, and a RADIUS **105**. The system also includes a number of gatherers, such as a gatherer **161**, a gatherer **162**, a gatherer **163**, a gatherer **164**, and a gatherer **165**. The system of FIG. **1** also includes a central event manager (CEM) **170** and a central database (repository) **175**. The system also includes a user interface server **185** and a number terminals or clients **180**.

This paragraph describes how the elements of FIG. **1** are coupled. The various network devices represent devices coupled to an IP network such as the Internet. The network devices perform various functions, such as the proxy server **101** providing proxy service for a number of clients. Each network device is coupled to a corresponding ISM. For example, the proxy server **101** is coupled to the ISM **110**. The DNS **102** is coupled to the ISM **120**. The firewall **103** is coupled to the ISM **130**. The ISM **136** is coupled to the LDAP **106**. The ISM **140** is coupled to the CISCO® NetFlow **104**. The ISM **150** is coupled to the RADIUS **105**. Each gatherer is

associated with at least one ISM. Thus, the gatherer **161** is associated with the ISM **110** and is therefore coupled to that ISM. The gatherer **162** is coupled to the ISM **120**. The gatherer **163** is coupled to the ISM **130** and the ISM **136**. The gatherer **164** is coupled to the ISM **140**. The gatherer **165** is coupled to the ISM **150**. The various gatherers are coupled to the GEM **170**. The user interface server is coupled to the terminals **180** and the CEM **170**.

The following paragraphs describe each of the various elements of FIG. **1**.

Network Devices

The network devices represent any devices that could be included in a network. (Throughout the description, a network device, unless specifically noted otherwise, also refers to an application server.) A network device represents a subset of information sources that can be used by the system **100**. That is, the network devices are merely representative of the types of sources of information that could be accessed. Other devices such as on-line transaction processing databases can be accessed in other embodiments of the invention. Typically, the network devices keep logging and statistical information about their activity. A network information source can be the log file of a mail server, the logging facility of a firewall, a traffics statistics table available on a router and accessible through SNMP, a database entry accessible through the Internet, an authentication server's query interface, etc. The network devices represent the information sources accessed by the ISMs.

Each type of network device can be accessing using a different method or protocols. Some generate logs while others are accessible via SNMP, others have proprietary APIs or use other protocols.

ISMs

The ISMs act as an interface between the gatherers and the network devices enabling the gatherers to collect data from the network devices. Thus, the ISMs represent modular, abstract interfaces that are designed to be platform-neutral. The information source modules act as interfaces or "translators", sending EP usage data, in real time, from the network devices to the gatherers. Each ISM is designed for a specific type of network data source. (In other embodiments, some ISM are generic in that they can extract information from multiple network devices). ISMs can be packaged separately, allowing NSPs to customize ISM configurations to meet the specific requirements of their network. For example, in the system of FIG. **1**, if the NSP did not have Cisco®NetFlow devices, then the ISM **140** would not have to be included.

The ISMs can communicate with its corresponding network device using protocols and formats such as UDP/IP, TCP/IP, SNMP, telnet, file access, ODBC, native API, and others.

In some embodiments, the reliability of system **100** is enhanced through on-the-fly dynamic reconfiguration, allowing the NSP to add or remove modules without disrupting ongoing operations. In these embodiments, the CEM **170** can automatically update the ISMs.

The following ISMs are available in some embodiments of the invention.

- Categorizer—Classifies a session to a category according to user-defined Boolean expression.
- DNS (e.g. ISM **120**)—Resolves host names and IP addresses.
- Generic Proxy Server (e.g., ISM **110**)—Collects data from access logs in a common log format.
- Port/Protocol Resolution—Converts protocol/port information to account names and vice versa.
- CheckPoint® Fire Wall-**1**—Collects data from FireWall-**1** accounting log and security log.
- Cisco® IOS® IP Accounting—Collects accounting data from a Cisco® router using IOS IP accounting.
- Cisco® NetFlow Switching—Collects session data from a Cisco® router via NetFlow switching.
- Netscape® Proxy Server—Collects data from a Netscape® Proxy Server.
- Microsoft® Proxy Server—Collects data from a Microsoft® Proxy Server.

ISMs can be synchronous, asynchronous or pipe.

The data from an asynchronous ISM is dynamic so that the asynchronous ISM reacts to the information and relays it to the associated gatherer without prompting from other information sources in the system **100**. If the firewall **103** were a CheckPoint®—FireWall-**1**, then the ISM **130** would be an example of an asynchronous ISM. When a network session is initiated, the details are recorded by the FireWall-**1 103**. The corresponding ISM **130** receives the details and passes them on automatically to the gatherer **163**.

Synchronous ISMs provide its information only when accessed by a gatherer. The ISM **120** is an example of a synchronous ISM. The DNS server **102** maintains information matching the IP addresses of host computers to their domain addresses. The ISM **120** accesses the DNS server **102** only when the ISM **120** receives a request from the gather **162**. When the DNS server **102** returns a reply, the ISM **120** relays the reply information to the gatherer **162**.

Pipe ISMs operate on record flows (batches of records received from information sources). Pipe ISMs process one or more enhancement flows the records as the flows arrive. The pipe ISM may initiate new record flows or may do other things such as generate alerts or provision network elements to provide or stop services. The pipe is implemented as an ISM to keep the internal coherency and logic of the architecture. (Record flows can terminate in a database or in a pipe ISM. The pipe ISM can perform filtering and aggregation, send alarms, or act as a mediation system to provision network elements when some event occurs or some accumulated value is surpassed. Specifically, pipe ISMs can act to enable pre-payment systems to disable certain services such as a voice IP call, when the time limit is surpassed or amount of data is reached.)

The gatherers can include caches and buffers for storing information from the ISMs. The buffers allow the gatherers to compensate for situations where there is a loss of connection with the rest of the system **100**. The cache sizes can be remotely configured. The cache minimizes the number of accesses to the Information Source.

ISM queries can be cached and parallelized. Caching of synchronous ISM queries provides for fast responses. Parallelizing queries allows for multiple queries to be processed at the same time.

Gatherers

The gatherers gather the information from the ISMs. In some embodiments, the gatherers are multi-threaded, lightweight, smart agents that run on non-dedicated host, as a normal user application on Windows NT® or Unix®, as a background process, or daemon. What is important though is that the gatherers can be any hardware and/or software that perform the functions of a gatherer.

The gatherers can be installed on the same network segment as the network device such as router and switch or on the application server itself. This placement of a gatherer minimizes the data traffic impact on the network.

The gatherers collect network session data from one or more ISMs. Session data can be sent to another gatherer for

enhancement or to the CEM **170** for merging and storing in the central database **170**. The gatherers can be deployed on an as needed basis for optimal scalability and flexibility.

The gatherers perform flexible, policy-based data aggregation. Importantly, the various types of ISMs provide different data and in different formats. The gatherers normalize the data by extracting the fields needed by the CEM **170** and filling in any fields that may be missing. Thus, the gatherers act as a distributed filtering and aggregation system. The distributed data filtering and aggregation eliminates capacity bottlenecks improving the scalability and efficiency of the system **100** by reducing the volume of data sent on the network to the CEM **170**.

Aggregation can be done by accumulating groups of data record flows, generating a single data record for each group. That single record then includes the aggregated information. This reduces the flow of the data records.

Filtering means discarding any record that belongs to a group of unneeded data records. Data records are unneeded if they are known to be collected elsewhere. A policy framework enables the NSP to configure what to collect where.

Filtering and/or aggregation can be done at any point along a data enhancement (described below) so that aggregation schemes can be based on enhanced data records as they are accumulated. The filtering and/or aggregation points are treated by the system **100** as pipe ISMs which are flow termination and flow starting points (ie: like an asynchronous ISM on the starting end and like a database on the terminating end). Data enhancement paths and filtering and/or aggregation schemes can be based on accumulated parameters such as user identification information and a user's contract type.

As noted above, the PISM can be used in the context of filtering and/or aggregation. One or more record flows can terminate at the PISM and can be converted into one or more new record flows. Record flows are grouped based on matching rules that apply to some of the fields in the record flows, while others are accumulated or undergo some other operation such as "maximum" or "avarage". Once the groups of accumulated records have reached some threshold, new accumulated records are output. This can be used for example in order to achieve a business-hybrid filtering and aggregation data reduction by imposing the business rules or the usage-based products that are offered to the customer, onto the record flows as they are collected in real-time. This is done instead of previous system where, the information is stored in a database and then database operations are performed in order to create bills or reports. The filtering and aggregation reduces the amount of data that is stored in the central database **175** while not jeopardizing the granularity of data that is necessary in order to create creative usage-based products.

Typically, data collected from a single source does not contain all the information needed for billing and accounting, such as user name and organization. In such cases, the data is enhanced. By combining IP session data from multiple sources, such as authentication servers, DHCP and Domain Name servers, the gatherers create meaningful session records tailored to the NSP's specific requirements. In the example of FIG. **1**, the gatherer **161** can provide information to the gatherer **162** so that the source IP address for an Internet session from the proxy server **101** can be combined with the domain address from the DNS server **102**.

The enhancement procedure can be triggered by an asynchronous ISM. The information from the asynchronous ISM is associated with field enhancements in the central database **175**. A field enhancement defines how a field in the central database is filled from the source data obtained from the asynchronous ISM. Through the field enhancements, the missing parameters are added to a record using the data collected from one or more synchronous ISMs. Enhancements are described in detail below.

The gatherers can include caches and buffers for storing information from the ISMs. The buffers allow the gatherers to compensate for situations where there is a loss of connection with the rest of the system **100**. The caches can reduce the number of accesses to an information source. The buffer and/or cache sizes can be remotely configured.

Central Event Manager (CEM)

The Central Event Manager (CEM) **170** acts as the central nervous system of the system **100**, providing centralized, efficient management and controls of the gatherers and the ISMs.

The CEM **170** can perform one or more of the following tasks:

Coordinates, controls, and manages the data collection process. The CEM **170** coordinates the operation of the gatherers and manages the flow of data through the system **100** through the collection scheme defined in the system configuration. The latter includes the configuration of the gatherers, the ISMs, the network devices, the fields in the central database **175** (described below), and the enhancement procedures. Based on the collection scheme the CEM **170** determines the system **100**'s computation flow (the set of operations the system **100** must perform to obtain the desired information). The CEM **170** then controls all the gatherers, instructing them to perform, in a particular sequence, the operations defined in the computation flow. The CEM **170** receives the records collected by the gatherers and stores them in the central database **175**. NSPs can configure the CEM **170** to merge duplicate records before storing them in the central database **175**. Record merging is described below.

Performs clean-up and aging procedures in the database **175**. The system **100** collects and stores large amounts of session information every day. The CEM **170** removes old data to free space for new data periodically. The NSP defines the expiration period for the removal of old records. The CEM **170** is responsible for coordinating the removal of records from the central database **175**. The CEM **170** places a time stamp on every record when the record enters the central database **175** and deletes the record after the time period the NSP has defined elapses.

Provides centralized system-wide upgrade, licensing, and data security. The NSP can perform version upgrades of the system **100** at the CEM **170**. The gatherers can be automatically upgraded once a new version is installed on the host computer of the CEM **170**. ISMs are also installed via the CEM **170** and exported to the gatherers. The CEM **170** maintains a list of licenses installed in the system and verifies periodically if the system is properly licensed. This feature lets the NSP centrally install and uninstall licenses. It also prevents unlicensed use of the system **100** and any of its components.

Monitors the state of the gatherers and ISMs. The gatherers periodically communicate with the CEM **170**. The CEM **170** continuously monitors the state of each gatherer and network devices in the system **100**. The CEM **170** can be fault-tolerant, that is, it can recover from any system crash. It coordinates the recovery of the system **100** to its previous state.

Central Database

The central database **175** is the optional central repository of the information collected by the system **100**. The central database **175** is but one example of a sink for the data gener-

ated in the system **100**. Other embodiments include other configurations. The central database **175** stores and maintains the data collected by the gatherers, as well as the information on the configuration of the system **100**. Thus, in configuring the system **100**, the NSP defines what data will be stored in each field in the central database **175** and how that data is collected from the ISMs.

The information on network sessions is stored in the database in the form of a table. Each field in the table represents a network session parameter. Each record describes a network session. The system **100** has a set of pre-defined fields that are configured by the CEM **170** on installation. The NSP can modify the central database **175** structure by adding, deleting, or modifying fields. The NSP access the data in the central database **175** by running queries and reports. The old data is removed from the central database **175** to free space for new data periodically. You can specify the time interval for which records are stored in the central database **175**. The structure of the central database **175** with some of the predefined fields is illustrated in the following figure.

As each IP session may generate multiple transaction records, during the merge process the CEM **170** identifies and discards duplications, enhancing the efficiency of the data repository. Generally, data records are passed through the merger program, in the CEM **170**, into the central database **175**. However, the data records are also cached so that if matching records appear at some point, the already stored records can be replaced or enhanced with the new records. The database tables that contain the record flows can be indexed, enhancing the efficiency of the data repository. A merge is achieved by matching some of the fields in a data record and then merging the matching records from at least two record flows, transforming them into one record before updating the central database **175**. In some embodiments, adaptive tolerance is used to match records. Adaptive tolerance allows for a variation in the values of fields that are compared (e.g., the time field value may be allowed to differ by some amount, but still be considered a match). The adaptive aspect of the matching can include learning the appropriate period to allow for the tolerance. The reason that the records that do not match any previous records are sent through into the central database **175**, in addition to being cached for later matching, is to avoid loss of data in case of system failure.

The following table illustrates an example of the types of records stored in the central database **175** by the CEM **170**.

The system **100** supports a non-proprietary database format enabling the central database **175** to run on any of a number of commercially available databases (e.g., MS-SQL Server, Oracle Server, DB2, etc.).

User Interface Server and Clients

The User Interface Server (UIS) **185** allows multiple clients (e.g. terminals **180**) to access the system **100** through, the Microsoft® Internet Explorer® with Java™. Plug-in or Netscape® Navigator with Java™. Plug-in. Other embodiments can use other applications to access the system **100**. The main function of the UIS **185** is to provide remote and local platform independent control for the system **100**. The UIS **185** can provide these functions through windows that correspond to the various components of the system **100**. Access to the system **100** can be password protected, allowing only authorized users to log in to the system and protecting sensitive information.

The NSP can perform one or more of the following main tasks through the UIS **185**:

Configure the system **100**.

Create and run queries and reports on network activity and resource consumption.

Register and license the system **100**.

C. Data Distillation

FIG. **2** illustrates the data distillation process performed by the system of FIG. **1**. The data distillation aggregates and correlate information from many different network devices to compile data useful in billing and network accounting.

First, the ISMs **210** gather data from their corresponding network device. Note that for some ISMs (e.g. pipe ISMs), real-time, policy-based filtering and aggregation **215** can also be done. This data is then fed to the gatherers **220**. The gatherers **220** perform data enhancement to complete the data from the ISMs **210**. The results are provided to the CEM **170**. The CEM **170** performs data merges **270** to remove redundant data. The merged data is then optionally stored in the central database **175** as a billing record **275** or is sent directly to an external system. The billing record information can be accessed from external applications, through the application interface **290**, via a data record **280**. Filtering and/aggregation and/or data enhancements can be done at any stage in the system **100**.

D. Data Enhancement

As mentioned above, the gatherers **220** provide data enhancement features to complete information received from

Source IP	Destination IP	Source Host	Destination Host	Service	Date/Time	Duration	Total Bytes	Counter
199.203.132.187	204.71.177.35	pcLev.xacct.com	yahoo.com	http	Apr. 26, 1998 10:56:55	6464	435666	261019
199.203.132.131	207.68.137.59	prodigy.xacct.com	microsoft.com	telnet	Apr. 26, 1998 10:56:55	747	66743	261020
199.203.132.177	199.203.132.1	pcEitan.xacct.com	xpert.com	smtp	Apr. 26, 1998 10:56:55	82	55667	261021
199.203.132.173	204.162.80.182	pcAdi.xacct.com	cnet.com	http	Apr. 26, 1998 10:56:55	93	33567	261022

the ISMs **210**. The following describes some example data enhancement techniques used in some embodiments of the invention.

FIG. **3** illustrates an example of data enhancement. Data enhancement comprises a number of field enhancements. A field enhancement specifies how the data obtained from the trigger of the enhancement procedure is processed before it is placed in a single field in the central database **175**. The data can be placed in the field directly, or new information may be added to the record by applying a Synchronous ISM function. (In the example below, the function is "resolve the IP address to a host FQDN"). Field enhancements may involve one or multiple steps. There is no limit to the number of steps in a Field Enhancement. The data record starts with fields obtained from an asynchronous ISM **300**. The fields in the DR **300** are then enhanced using the field enhancements. The enhanced fields result in the DR **320**.

A visual representation of an enhancement can be presented to the NSP. The enhancement may include an itinerary of ISMs starting off with an AISM, passing through PISMs, and terminating in the CEM **170**. Using this view of the system **100**, the NSP need not be shown the actual flow of data since the flow may be optimized later in order to achieve better performance. This is more of a graphical logical view of how the enhancement is achieved in steps. (PISMs can terminate more than one flow and initiate more than one flow.)

A visual representation of a field enhancement shows the per-field flow of data correlation. This process ends in the CEM **170** or in a PISM. The NSP supplies information telling the system **100** how to reach each of the terminating fields (in the CEM **170** or the PISM) starting off from the initiating fields (PISM or AISM). Each step of enhancement defines cross correlation with some SISM function.

FIG. **4A** illustrates various field enhancements (**410** through **440**). A field enhancement includes applying zero or more functions to a field before storing the field in a specified field in the central database **175**.

One-step Field Enhancement **410**. The initial source data from the asynchronous ISM is placed directly in a field in the central database **175**. Example: the field enhancement for the Source IP field.

Two-step Field Enhancement **420**. The initial source data from the asynchronous ISM is used to obtain new additional data from a synchronous network device and the new data is placed in a field in the central database **175**. Example: the field enhancement for the Source Host field.

Three-step Enhancement **430**. The initial source data from the asynchronous ISM is used to obtain additional data from a synchronous ISM. The result is used to obtain more data from another ISM and the result is placed in a field in the central database **175**.

The following illustrates an example data enhancement. Suppose the data obtained from a proxy server **101** contains the source IP address of a given session, such as 199.203.132.2, but not the complete domain address of the host computer (its Fully Qualified Domain Name), such as www.xacct.com. The name of the host can be obtained by another network device—the Domain Name System (DNS **102**) server. The DNS server **102** contains information that matches IP addresses of host computers to their Fully Qualified Domain Names (FQDNs). Through an enhancement procedure the information collected from the proxy server **101** can be supplemented by the information from the DNS **102**. Therefore, the name of the host is added to the data (the data record) collected from the proxy server **101**. The process of adding new data to the data record from different network devices can be repeated several times until all required data is collected and the data record is placed in the central database **175**.

FIG. **4B** illustrates another example data enhancement where an enhanced record **490** is created from an initial netflow record **492**. Fields in the enhanced record **490** are enhanced from the radius record **494**, the QoS policy server record **496**, the NMS DB record **498**, and the LDAP record **499**.

Defining Enhancement Procedures

The following describes the process for defining enhancement procedures in some embodiments of the system. Typically defining an enhancement procedures for the system **100** includes (1) defining enhancement procedures for each asynchronous ISM and (2) configuring field enhancements for all fields in the central database **175** for which the NSP wants to collect data originating from an asynchronous ISM that triggers the corresponding enhancement procedure.

An enhancement procedure can be defined as follows:

1. Access the CEM **170** using the UIS **180**.
2. Select the enhancement procedures list using the UIS **180**.
3. Define the name of the new enhancement procedure.
4. Select a trigger for the new enhancement procedure. The trigger can correspond to any asynchronous ISM in the system **100**. Alternatively, the trigger can correspond to any asynchronous ISM in the system **100** that has not already been assigned to an enhancement procedure.
5. Optionally, a description for the enhancement procedure can be provided.
6. The new enhancement procedure can then be automatically populated with the existing fields in the central database **175**. Optionally, the NSP can define the fields (which could then be propagated to the central database **175**). Alternatively, based upon the type of asynchronous ISM, a preset set of fields could be proposed to the NSP for editing. What is important is that the NSP can define field procedures to enhance the data being put into the data records of the central database **175**.
7. The NSP can then define the field enhancements for every field in the new enhancement procedure for which the NSP wants to collect data from the ISM that is the trigger of the new enhancement procedure.

Defining Field Enhancements

Defining a field enhancement involves specifying the set of rules used to fill a database field from the information obtained from the trigger of the enhancement procedure. The NSP defines field enhancements for each field in which NSP wants to collect data from the trigger. If no field enhancements are defined, no data from the trigger will be collected in the fields. For example, suppose the firewall asynchronous ISM **130** that triggers an enhancement procedure. Suppose the central database **175** has the following fields: source IP, source host, destination IP, destination host, user name, total bytes, service, date/time, and URL. If the NSP wants to collect session data for each field except the URL from the firewall ISM **130**, which triggers the enhancement procedure, the NSP defines a field enhancement for each field with the exception of the URL.

In some embodiments, the field enhancements are part of the enhancement procedure and the NSP can only define and modify them when the enhancement procedure is not enabled.

The field enhancements can be defined in a field enhancement configuration dialog box. The field enhancement configuration dialog box can have two panes. The first displays the name of the enhancement procedure, the name of its

trigger, and the name and data type of the field for which the NSP is defining the field enhancement. The second is dynamic and interactive. Its content changes depending on the NSP's input. When first displayed, it has two toggle buttons, End and Continue, and a list next to them. The content of the list depends on the button depressed.

When End is depressed, the list contains all output fields whose data type matches the data type of the field for which the NSP is defining the field enhancement. For example, if the field's data type is IP Address, the list contains all fields that are of the same type, such as source IP and destination IP that the AISM supplies. The fields in the list can come from two sources: (1) the source data which the gatherer receives from the trigger and (2) the result obtained by applying a synchronous ISM function as a preceding step in the field enhancement. The following notation is used for the fields:

OutputFieldName for the output of a field origination from the trigger SISName.FunctionName(InputArgument).OutputField for the output of a field that is the result of applying a function

SISName . . . OutputField for the output of a field that is the result of applying a function as the final step of a field enhancement

The following examples are presented.

Source IP is the field provided by the trigger of the enhancement procedure that contains the IP address of the source host.

DNS . . . Host Name and DNS.Name(Source IP).Host name are the names of a field originating from the resolved function Name of a network device called DNS that resolves the IP address to a domain address. The input argument of the function is the field provided by the trigger of the enhancement procedure, called source IP. It contains the IP address of the source host. The function returns the output field called Host Name that contains the domain address of the source host. The notation DNS . . . Host Name is used when the field is the result of applying the function as the final step of a field enhancement. The notation is DNS.Name(Source IP).Host Name is used when the field is used as the input to another function.

In the user interface, if End is unavailable, none of the output fields matches the data type of the field.

When Continue is depressed, the list contains all applicable functions of the available synchronous network device configured in the system **100**. If the preceding output does not match the input to a function, it cannot be applied and does not appear on the list.

The following notation is used for the functions:

SISName.FunctionName(InputFieldName:InputFieldDataType)→(OutputFieldName:OutputFieldDataType)

When the function has multiple input and/or output arguments, the notation reflects this. The arguments are separated by commas.

The following example shows a field enhancement.

DNS. Address(Host Name:String)→(IP Address:IP Address)

Where DNS is the name of the synchronous ISM (or network device) as it appears in the system configuration.

Address is the name of the function.

(Host Name:String) is the input to the function—host FQDN of data type String

(IP Address:IP Address) is the output—IP address of data type IP Address

The NSP can define the field enhancement by choosing items from the list. The list contains the option <none> when the End button is depressed. Choosing this option has the

same effect as not defining a field enhancement: no data from the trigger will be stored in the field in the central database **175**.

E. Record Merges

FIG. **5** illustrates an example record merge. Record merging removes duplicate records from the central database **175**.

The following example shows how merges work and illustrates the need for merging duplicate records. Suppose the system **100** is using two asynchronous ISMs **110** and **130**. All outbound network traffic going through the proxy server **101** is routed through the firewall **103**. The firewall **103** records the proxy server **101** as the source of all sessions passing through the proxy server **101**, although they originate from different workstations on the network. At the same time, the proxy server **101** records the destination of all sessions as the firewall **103**, although their actual destinations are the different Internet sites.

Therefore, all sessions are logged twice by the system **100** and the records are skewed. The data from the firewall **103** indicates the destination of a given session, but not the source (see data record **520**), while the data from the proxy server **101** records the source, but not the destination (see data record **510**). Defining a merge eliminates the duplication of records.

A merge can be defined instructing the CEM **170** to store the destination data obtained from the firewall **103** and the source data from the proxy server **101** in the central database **175**. The merge will also eliminate the problem of skewed data by storing the correct source and destination of the session in the central database **175**. Both network devices provide information on the URL. The latter can be used to identify the fact that the two seemingly independent records (**510** and **520**) are actually two logs of the same session.

Two enhancement procedures are defined for the example of FIG. **5**. The trigger of the first, designated Flow One, is the Proxy Server Asynchronous Information Source Module. The trigger of the second, Flow Two, is the Firewall Asynchronous Information Source Module. The records from Flow One and Flow Two are records of the same session. They both have the same value for the URL field. Based on this value, the CEM **170** identifies the two records are double logs of the same session. It merges the two data records taking the Source IP value from Flow One and the Destination IP from Flow Two as the values to be stored in the central database **175**.

Defining Merges

The following describes defining merges. A merge is a set of rules that specify how duplicate records from multiple enhancement procedures must be identified and combined before being stored in the central database **175**. The NSP can merge the records from two or more enhancement procedures. To define a merge, the NSP identifies the following information.

The enhancement procedures included in the merge.

How to identify duplicate records (which fields of the records must match).

How to combine the records; that is, for each field, which value (from which enhancement procedure) must be stored in the central database **175**.

(Optional)

If the NSP does not specify how records must be combined, the records are merged as follows:

When the values in all but one of the fields are null, the non-null value is stored.

When the fields contain non-null values, the value of the first record received (chronologically) is stored.

F. Additional Embodiments

The following describes additional embodiments of the invention.

In some embodiments, the user interface used by an NSP to configure the system **100** can be presented as a graphical representation of the data enhancement process. Every step in the enhancement can be shown as a block joined to another block (or icon or some graphical representation). The properties of a block define the operations within the block. In some embodiments, the entire data enhancement process from network devices to the central database **175** can be shown by linked graphics where the properties of a graphic are the properties of the enhancement at that stage.

In some embodiments, multiple CEMs **170** and/or central databases **175** can be used as data sources (back ends) for datamart or other databases or applications (e.g., customer care and billing systems).

In some embodiments, the types of databases used are not necessarily relational. Object databases or other databases can be used.

In some embodiments, other platforms are used. Although the above description of the system **100** has been IP network focused with Unix or Windows NT systems supporting the elements, other networks (non-IP networks) and computer platforms can be used. What is important is that some sort of processing and storing capability is available at the gatherers, the CEMs, the databases, and the user interface servers.

In some embodiments, the gatherers and other elements of the system **100**, can be remotely configured, while in other embodiments, some of the elements need to be configured directly. For example, a gatherer may not be remotely configurable, in which case, the NSP must interface directly with the computer running the gatherer.

In other embodiments, the general ideas described herein can be applied to other distributed data enhancement problems. For example, some embodiments of the invention could be used to perform data source extraction and data preparation for data warehousing applications. The gatherers would interface with ISMs that are designed to extract data from databases (or other data sources). The gatherers would perform filtering and aggregation depending upon the needs of the datamart (in such an embodiment, the central database and CEM could be replaced with/used with a datamart). The data enhancement would then be done before storing the information in the datamart.

FIG. **6** illustrates a system **600** where multiple systems **100** are linked together. This system could be an ISPs point of presence accounting system. The system **620** and the system **610** can store detailed network accounting information in their local detailed accounting databases. This information can then be aggregated and sent over the more expensive long distance links to the billing database in the system **630**. Customer service information can still be accessed at the detailed accounting database, but the aggregated information may be all that is needed to create the bills.

Additional embodiments of the invention are described in the attached appendices A-F.

G. Conclusions

A network accounting and billing system and method has been described. In some embodiments, the system can access any network related information sources such as traffic statistics provided by routers and switching hubs as well as application server access logs. These are accumulated in a central database for creating auditing, accounting and billing reports. Because of the distributed architecture, filtering and enhancements, the system efficiently and accurately collects the network usage information for storage in a form that is useful for billing and accounting.

We claim:

1. A method for reporting on a collection of network usage information from a plurality of network devices, comprising:

collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers;

filtering and aggregating the network communications usage information;

completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;

storing the plurality of data records in a database;

submitting queries to the database utilizing predetermined reports for retrieving information on the collection of the network usage information from the network devices; and

outputting a report based on the queries;

wherein resource consumption queries are submitted to the database utilizing the reports for retrieving information on resource consumption in a network; and

wherein a resource consumption report is outputted based on the resource consumption queries.

2. A method as recited in claim **1**, further comprising merging a first one of the plurality of data records with a second one of the plurality of data records prior to storing the plurality of data records in the database, if it is determined that a first field value of the first data record matches a second field value of the second data record.

3. A method as recited in claim **2**, wherein a tolerance is utilized in determining whether the first field value of the first data record matches the second field value of the second data record.

4. A method as recited in claim **3**, wherein the tolerance indicates an amount the first field value of the first data record is allowed to differ from the second field value of the second data record, while still being considered a match.

5. method as recited in claim **3**, wherein the tolerance is adaptive based on a learned amount allowed for by the tolerance.

6. A method as recited in claim **2**, wherein merging the first data record and the second data record includes storing a third field value of the first data record and a fourth field value of the second data record in a single merged record, wherein the third field value and the fourth field value are different.

7. A method as recited in claim **1**, and further comprising generating an alert upon occurrence of an event.

8. A method as recited in claim **7**, wherein the alert is generated upon a value surpassing a predetermined amount.

9. A method as recited in claim **7**, wherein the alert indicates that services should be ceased.

10. A method as recited in claim **7**, wherein the alert indicates that services should be provided.

11. A method as recited in claim **1**, and further comprising submitting network activity queries to the database utilizing the reports for retrieving information on activity of the network.

12. A method as recited in claim **11**, and further comprising outputting a network activity report based on the network activity queries.

13. A method as recited in claim **1**, wherein the report includes an auditing report.

14. A method as recited in claim **1**, wherein the report includes a billing report.

15. A method as recited in claim **1**, wherein the report includes an accounting report.

16. A computer program product stored in a computer readable medium for reporting on a collection of network usage information from a plurality of network devices, comprising:

computer code for collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers;

computer code for filtering and aggregating the network communications usage information;

computer code for completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;

computer code for storing the plurality of data records in a database;

computer code for submitting queries to the database utilizing predetermined reports for retrieving information on the collection of the network usage information from the network devices; and

computer code for outputting a report based on the queries;

wherein resource consumption queries are submitted to the database utilizing the reports for retrieving information on resource consumption in a network; and

wherein a resource consumption report is outputted based on the resource consumption queries.

17. A computer program product as recited in claim **16**, and further comprising computer code for submitting network activity queries to the database utilizing the reports for retrieving information on activity of the network.

18. A computer program product as recited in claim **17**, and further comprising computer code for outputting a network activity report based on the network activity queries.

19. A computer program product as recited in claim **16**, and further comprising computer code for generating an alert upon occurrence of an event.

20. A computer program product as recited in claim **19**, wherein the alert is generated upon a value surpassing a predetermined amount.

21. A system including a tangible computer readable medium for reporting on a collection of network usage information from a plurality of network devices, comprising:

means for collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers;

means for filtering and aggregating the network communications usage information;

means for completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;

means for storing the plurality of data records in a database;

means for submitting queries to the database utilizing predetermined reports for retrieving information on the collection of the network usage information from the network devices; and

means for outputting a report based on the queries;

wherein resource consumption queries are submitted to the database utilizing the reports for retrieving information on resource consumption in a network; and

wherein a resource consumption report is outputted based on the resource consumption queries.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.	: 7,412,510 B2
APPLICATION NO.	: 11/058956
DATED	: August 12, 2008
INVENTOR(S)	: Schweitzer et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page:

Item (63); please replace "Continuation of application No. 09/935,129, filed on Aug. 21, 2001, now Pat. No. 6,947,984, which is a continuation of application No. 09/442,876, filed as application No. PCT/US98/24963 on Nov. 20, 1998, now Pat. No. 6,418,467." with --Continuation of application No. 09/935,129, filed on Aug. 21, 2001, now Pat. No. 6,947,984, which is a continuation of application No. 09/442,876, filed on Nov. 18, 1999, now Pat. No. 6,418,467, which claims priority to a PCT application filed Nov. 20, 1998 under serial number PCT/US98/24963.--.

In the claims:

Claim 5, col. 16, line 41; please insert --A-- before "method".

Signed and Sealed this
Thirty-first Day of January, 2012

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office

US007631065B2

(12) **United States Patent**
Schweitzer et al.

(10) **Patent No.: US 7,631,065 B2**
(45) **Date of Patent: Dec. 8, 2009**

(54) **SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR MERGING DATA IN A NETWORK-BASED FILTERING AND AGGREGATING PLATFORM**

(75) Inventors: **Limor Schweitzer**, Tel-Aviv (IL); **Eran Wagner**, Cupertino, CA (US); **Tal Givoly**, Cupertino, CA (US)

(73) Assignee: **Amdocs (Israel) Ltd.**, Ra'anana (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2504 days.

(21) Appl. No.: **10/012,962**

(22) Filed: **Dec. 7, 2001**

(65) **Prior Publication Data**

US 2002/0091811 A1 Jul. 11, 2002

Related U.S. Application Data

(63) Continuation of application No. 09/442,876, filed on Nov. 18, 1999, now Pat. No. 6,418,467.

(60) Provisional application No. 60/066,898, filed on Nov. 20, 1997, provisional application No. 60/109,095, filed on Nov. 19, 1998.

(51) **Int. Cl.**
G06F 13/00 (2006.01)

(52) **U.S. Cl.** **709/224**

(58) **Field of Classification Search** 709/224
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,463,222	A	8/1969	Grames	165/10
4,396,058	A	8/1983	Kurschner et al.	165/8
4,449,573	A	5/1984	Pettersson et al.	165/10
4,491,725	A	1/1985	Pritchard	235/375
4,744,410	A	5/1988	Groves	165/10
4,750,201	A	6/1988	Hodgson et al.	379/144
4,870,561	A	9/1989	Love et al.	364/192
4,883,948	A	11/1989	Sunyich	235/382
5,008,929	A	4/1991	Olsen et al.	379/114.28
5,103,464	A	4/1992	Capkun et al.	375/106
5,103,475	A	4/1992	Shuen	379/115.01
5,117,430	A	5/1992	Berglund	370/85.1
5,285,494	A	2/1994	Sprecher et al.	455/423
5,333,183	A	7/1994	Herbert	379/112.07

(Continued)

FOREIGN PATENT DOCUMENTS

EP 0 498 751 8/1992

(Continued)

OTHER PUBLICATIONS

Office Action Summary from U.S. Appl. No. 11/058,956 which was mailed on Jul. 10, 2007.

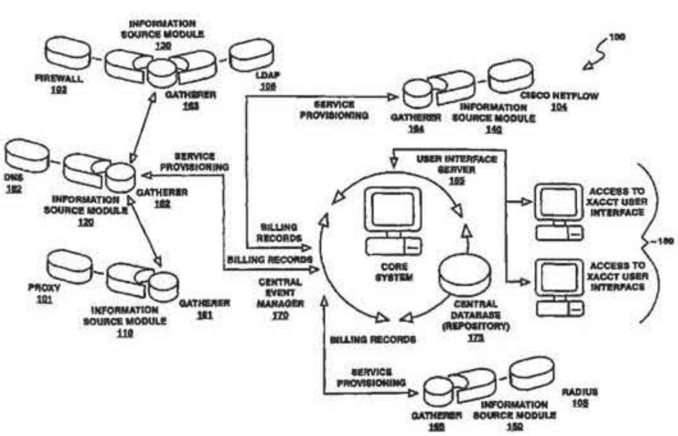
(Continued)

Primary Examiner—Robert B Harrell
(74) *Attorney, Agent, or Firm*—Zilka-Kotab, PC

(57) **ABSTRACT**

A system and method are provided for processing network accounting information. A first network accounting record is received from a first source. Thereafter, the first network accounting record is correlated with accounting information available from a second source. The accounting information with which the first network accounting record is correlated is then used to enhance the first network accounting record.

20 Claims, 7 Drawing Sheets



U.S. PATENT DOCUMENTS

5,491,796	A	2/1996	Wanderer et al.	709/102
5,500,934	A	3/1996	Austin et al.	395/755
5,557,746	A	9/1996	Chen et al.	709/202
5,615,323	A	3/1997	Engel et al.	345/440
5,627,886	A	5/1997	Bowman	379/111
5,659,601	A	8/1997	Cheslog	455/406
5,778,350	A	7/1998	Adams et al.	707/1
5,781,729	A	7/1998	Baker et al.	709/230
5,781,735	A	7/1998	Southard	709/223
5,793,853	A	8/1998	Sbisa	379/120
5,796,941	A	8/1998	Lita	713/201
5,812,529	A	9/1998	Czarnik et al.	370/245
5,819,028	A	10/1998	Manghirmalani et al.	714/57
5,832,068	A	11/1998	Smith	379/114.14
5,852,818	A	12/1998	Guay et al.	707/1
5,870,557	A	2/1999	Bellovin et al.	395/200.54
5,872,931	A	2/1999	Chivaluri	709/223
5,889,958	A	3/1999	Willens	709/229
5,905,715	A	5/1999	Azarmi et al.	370/244
5,905,868	A	5/1999	Baghai et al.	709/224
5,915,006	A	6/1999	Jagadish et al.	379/115.01
5,930,773	A	7/1999	Crooks et al.	705/30
5,941,955	A	8/1999	Wilby et al.	709/242
5,943,657	A	8/1999	Freestone et al.	705/400
5,958,010	A	9/1999	Agarwal et al.	709/224
5,987,107	A	11/1999	Brown	379/114.12
6,011,838	A	1/2000	Cox	379/112.06
6,023,694	A	2/2000	Kouchi et al.	707/2
6,032,147	A	2/2000	Williams et al.	707/101
6,088,659	A	7/2000	Kelley et al.	702/62
6,088,688	A	7/2000	Crooks et al.	705/412
6,101,170	A	8/2000	Doherty et al.	370/255
6,104,704	A	8/2000	Buhler et al.	370/252
6,104,711	A	8/2000	Voit	370/352
6,128,657	A	10/2000	Okanoya et al.	709/224
6,148,335	A	11/2000	Haggard et al.	709/224
6,157,648	A	12/2000	Voit et al.	370/401
6,181,679	B1	1/2001	Ashton et al.	370/244
6,189,101	B1	2/2001	Dusenbury, Jr.	726/2
6,208,720	B1	3/2001	Curtis et al.	379/114
6,216,169	B1	4/2001	Booman et al.	709/246
6,230,203	B1	5/2001	Koperda et al.	709/229
6,243,667	B1	6/2001	Kerr et al.	703/27
6,272,126	B1	8/2001	Strauss et al.	370/352
6,308,148	B1	10/2001	Bruins et al.	703/27
6,320,944	B1	11/2001	Schlossman et al.	379/117
6,359,976	B1	3/2002	Kalyanpur et al.	379/134
6,405,251	B1	6/2002	Bullard et al.	709/224
6,418,467	B1	7/2002	Schweitzer et al.	709/223
6,452,925	B1	9/2002	Sistanizadeh et al.	370/352
6,470,386	B1	10/2002	Combar et al.	709/224
6,598,078	B1	7/2003	Ehrlich et al.	709/224
6,601,048	B1	7/2003	Gavan et al.	706/10
6,650,639	B2	11/2003	Doherty et al.	370/389
6,658,465	B1	12/2003	Touboul	709/223
6,751,738	B2	6/2004	Wesinger, Jr. et al.	713/201
6,850,974	B2	2/2005	Schweitzer et al.	709/223
6,947,984	B2	9/2005	Schweitzer et al.	709/224
6,985,941	B2	1/2006	Schweitzer et al.	709/224
7,058,600	B1	6/2006	Combar et al.	705/34
7,412,510	B2	8/2008	Schweitzer et al.	709/224
2008/0059346	A1	3/2008	Schweitzer et al.	705/30

FOREIGN PATENT DOCUMENTS

EP	1 006 690	6/2000
EP	1 039 693	9/2000
EP	1 094 635	4/2001
WO	WO 91/03023	3/1991
WO	98/28879	7/1998

OTHER PUBLICATIONS

Notice of Allowability from U.S. Appl. No. 09/935,129 which was mailed on Apr. 28, 2005.
Examiner's Supplemental Amendment from U.S. Appl. No. 09/935,129 which was mailed on Jan. 4, 2005.
Notice of Allowance from U.S. Appl. No. 09/935,129 which was mailed on Aug. 17, 2004.
Office Action Stummary from U.S. Appl. No. 09/935,129 which was mailed on Mar. 22, 2004.
Office Action Summary from U.S. Appl. No. 09/935,129 which was mailed on Aug. 27, 2003.
Notice of Allowance from U.S. Appl. No. 09/935,139 which was mailed on Jun. 10, 2004.
Office Communication from U.S. Appl. No. 09/935,139 which was mailed on Jan. 23, 2004.
Office Action Summary from U.S. Appl. No. 09/935,139 which was mailed on Aug. 14, 2003.
Advisory Action from U.S. Appl. No. 09/935,139 which was mailed on May 5, 2003.
Final Office Action Summary from U.S. Appl. No. 09/935,139 which was mailed on Feb. 26, 2003.
Office Action Summary from U.S. Appl. No. 09/935,139 which was mailed on Sep. 11, 2002.
Supplemental Notice of Allowability from U.S. Appl. No. 09/935,130 which was mailed on Aug. 22, 2005.
Notice of Allowability from U.S. Appl. No. 09/935,130 which was mailed on Apr. 27, 2005.
Examiner's Supplemental Amendment from U.S. Appl. No. 09/935,130 which was mailed on Jan. 4, 2005.
Notice of Allowance from U.S. Appl. No. 09/935,130 which was mailed on Aug. 13, 2004.
Final Office Action Summary from U.S. Appl. No. 09/935,130 which was mailed on May 18, 2004.
Final Office Action Summary from U.S. Appl. No. 09/935,130 which was mailed on Mar. 5, 2004.
Office Action Summary from U.S. Appl. No. 09/935,130 which was mailed on Oct. 3, 2003.
Notice of Allowance from U.S. Appl. No. 11/058,956 which was mailed on Jun. 6, 2008.
Office Action Summary from U.S. Appl. No. 11/058,956 which was mailed on Dec. 6, 2007.
Office Action Summary from U.S. Appl. No. 11/058,956 which was mailed on Nov. 15, 2006.
Office Action Summary from U.S. Appl. No. 11/850,465 which was mailed on Nov. 13, 2008.
XACCT Usage Overview, XACCT Technologies, 1997.
HP and Cisco Deliver Internet Usage Platform and Billing and Analysis Solutions (http://www.hp.com/smartinternet/press/prapr28.html), Hewlett Packard Company, 1998.
Article, Quadri, et al., Internet Usage Platform White Paper (http://www.hp.com/smartinternet/solutions/usagewp.), Hewlett Packard Company, 1998.
Article, Strategies for Managing IP Data (http://www.hp.com/smartinternet/press/not.html), Hewlett Packard Company Undated.
Article, Nattkemper, HP and Cisco Deliver Internet Usage and Billing Solutions (http://www.interex.org/hpworldnews/hpW806.html), Hewlett Ppackard Company, Jun. 1, 1999(?).
HP Smart Internet Billing Solution (http://hpcc925.external.hp.com/smartinternet/solutions/usagebilling.html), Hewlett Packard Company, 1998.
HP Smart Internet Usage Analysis Solution (http://www.hp.com/smartinternet/solutions/usageanalysis.html), Hewlett Packard Company, 1998.
Press Release, New cisco IOS NetFlow Software and Utilities Boost Service Provider Revenues and Service Management Capabilities (http://www.cisco.com/warp/public/cc/cisco/mkt/gen/pr/archive/cros pr.htm), Cisco Systems, Inc., Jul. 1, 1997.
Documentation, NewFlow Flow Collector 2.0 (http://www.cisco.com/univerca/cc/td/doc/product/rtrmgmt/nfc/nfc 2 0/index.htm), Cisco Systems, Inc., 1998.

Article, Mary Jander, Hot Products: Network Management—Usage Monitoring Intranet Inspector (http://www.data.com/issue/990107/manage3.html), Tech Web, CMP Media Inc., Jan. 1999.

Article, Loring Wirbel, Tools coming for probing, for probing, billing of IP packets (http://www.techweb.com/se/directlink.cgi?EET19981214S0033), EETIMES, Issue 1039, Section: Systems & Software, Dec. 14, 1998, CMP Media Inc.

Article, Loring Wirbel, Tools enable usage-based billing on the Net (http://www.eetimes.com/story/OEG19981208S0007), EETIMES, Dec. 8, 1998, CMP Media Inc.

Article, Limor Schweizer, Meeting the IP Network Billing Challenge (http://www.tmcnet.com/tmcnet/articles/xacct1298.htm), TMCnet, Dec. 1998(?).

Product Review, XACCTusage (http://www.xacct.com/news/xuoverview.htm), internet.com, Internet Product Watch (?) Undated.

Article, Loring Wirbel, In next-generation networks. ISPs are calling the shots (http://www. techweb.com/se/direct link,ctil?EET19981019 S0058), EETIMES, Issue 1031, Section: Communications, Oct. 19, 1998, CMP Media Inc.

Article, Kate Gerwig, ISPs take 'Do-It-Yourself Tack With Billing (http://www.internetwk.com/news1098/news101398-3.htm), CMP's Tech Web, CMP Media Inc., Oct. 12, 1998.

Article, Kathleen Cholewka, Xacct Makes It Easier to Bill For IP Service (http://www.zdnet.com/intweek/daily/981005d.html), Inter@active Week, ZDNet, Oct, 5, 1998.

Article, Lucas et al., Mediation in a Multi-Service IP Network (http://www.xacct.com/news/art100198.html), XACCT Technologies, Inc., Oct. 1, 1998.

Article, Matt Hamblen, Middleware enables 'net usage planning (http://www.xacct.com/news/art092898.html), Computerworld, vol. 32, No. 29, Sep. 28, 1998.

Article, Tim Greene, XAACT pinpoints IP network usage (http://www.xacct.com/news/art092198.html), Network World, vol. 15, No. 38, Sep. 21, 1998.

Article, Margie Semilof, Charging, for IP use gets easier (http://www.xacct.com/news/art092198b.html), Computer Reseller News, Sep. 21, 1998.

Article, Kate Gerwig, Creating Meter Readers For The Internet (http://www.techweb.com/se/directlink,cgi?INW19980921S0042), Internetweek, Issue: 733, Section: Bandwidth, Sep. 21, 1998, CMP Media Inc.

Article, John Morency, XaCCT offers multivendor, multi-technology billing model for ISP consumption (http://www.nwfusion.com/newsletters/nsm/0914nm2.html), Newwork World Fusion Focus on Network/Systems Management, Network World, Inc., Sep. 16, 1998.

Article, Shira Levine, XACCT brings flexible billing to the IP world. (http://www.americasnetwork.com/news/9809/980915 xacct.html), Advanstar Communications, Sep. 15, 1998.

Telecom Product News. Accounting and Reporting System for Corporate Network Resouce and IS Use (http://www.xacct.com/news/pressreleases/papers3.html), XACCT Technologies, Inc., Apr. 1998.

Article, BYTE's Best of Show Award at CeBIT Goes To SuperNova;s Visual Concepts (http://www.byte.com/special/3cebit98.htm), Byte, Mar. 23, 1998.

Press Release, XACCT Teams With Kenan to Provide Advanced Solution For Usage-Based Billing of IP Applications (http://www.xacct.com/news/pressreleases/papers8.html), XACCT Technologies, Inc., Oct. 26, 1998.

Press Release, Solect and XACCT Partner to Provice IP Usage-based Billing Solution (http://www.xacct.com/news/pressreleases/papers7.html), XACCT Technologies, Inc., Sep. 28, 1998.

Press Release, XACCT Supports Cisco's New Web-Based Enterprise Management Suite (http://www.xacct.com/news/pressreleases/papers6.html), XACCT Technologies, Inc., Sep. 22, 1998.

Press Release, XACCT Technologies Enables Usage-Based Billing for Internet (http://www.xacct.com/news/pressreleases/papers4,html), XACCT Technologies, Inc., Sep. 21, 1998.

News Release, XACCT Technologies Now shipping Accounting and Reporting System for Corporate network Resource and ISP Use (http://www.xacct.com/news/pressreleases/papers1.html), XACCT Technologies, Inc., Mar. 19, 1998.

News Release, XACCT Technologies Releases Accounting and Reporting System for ISP and Corporate Network Resource Use (http://www.xacct.com/news/pressrelease/papers.html), XACCT Technology, Inc., Dec. 10, 1997.

Office Action Summary from U.S. Appl. No. 11/850,465 mailed on Jul. 20, 2009.

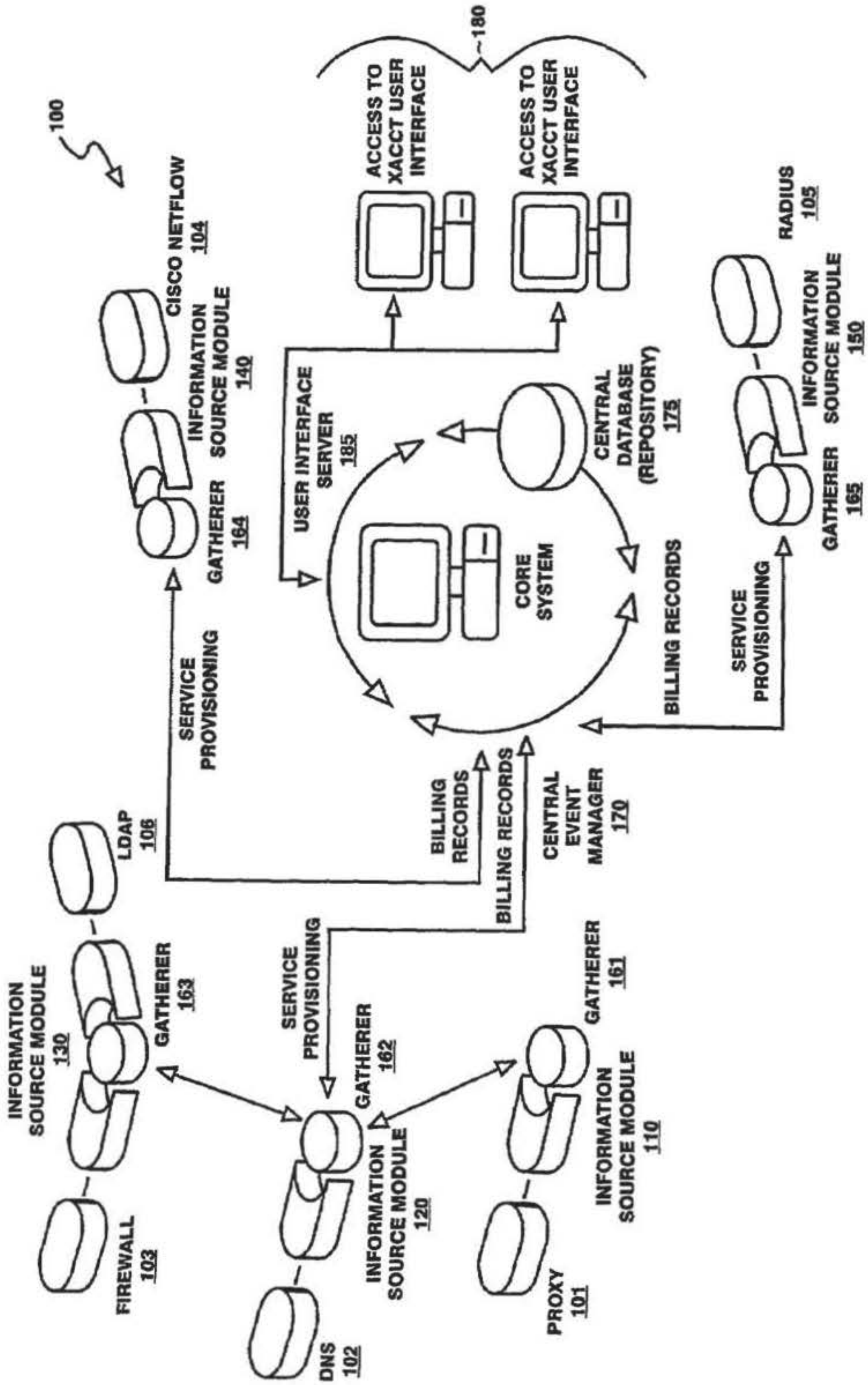

100
180
ACCESS TO XACCT USER INTERFACE
ACCESS TO XACCT USER INTERFACE
CISCO NETFLOW 104
INFORMATION SOURCE MODULE 140
GATHERER 164
USER INTERFACE SERVER 185
CENTRAL DATABASE (REPOSITORY) 175
CORE SYSTEM
RADIUS 105
INFORMATION SOURCE MODULE 150
GATHERER 165
SERVICE PROVISIONING
BILLING RECORDS
SERVICE PROVISIONING
BILLING RECORDS
BILLING RECORDS
CENTRAL EVENT MANAGER 170
LDAP 106
SERVICE PROVISIONING
INFORMATION SOURCE MODULE 130
GATHERER 163
GATHERER 162
GATHERER 161
FIREWALL 103
INFORMATION SOURCE MODULE 120
DNS 102
INFORMATION SOURCE MODULE 110
PROXY 101

FIG. 1

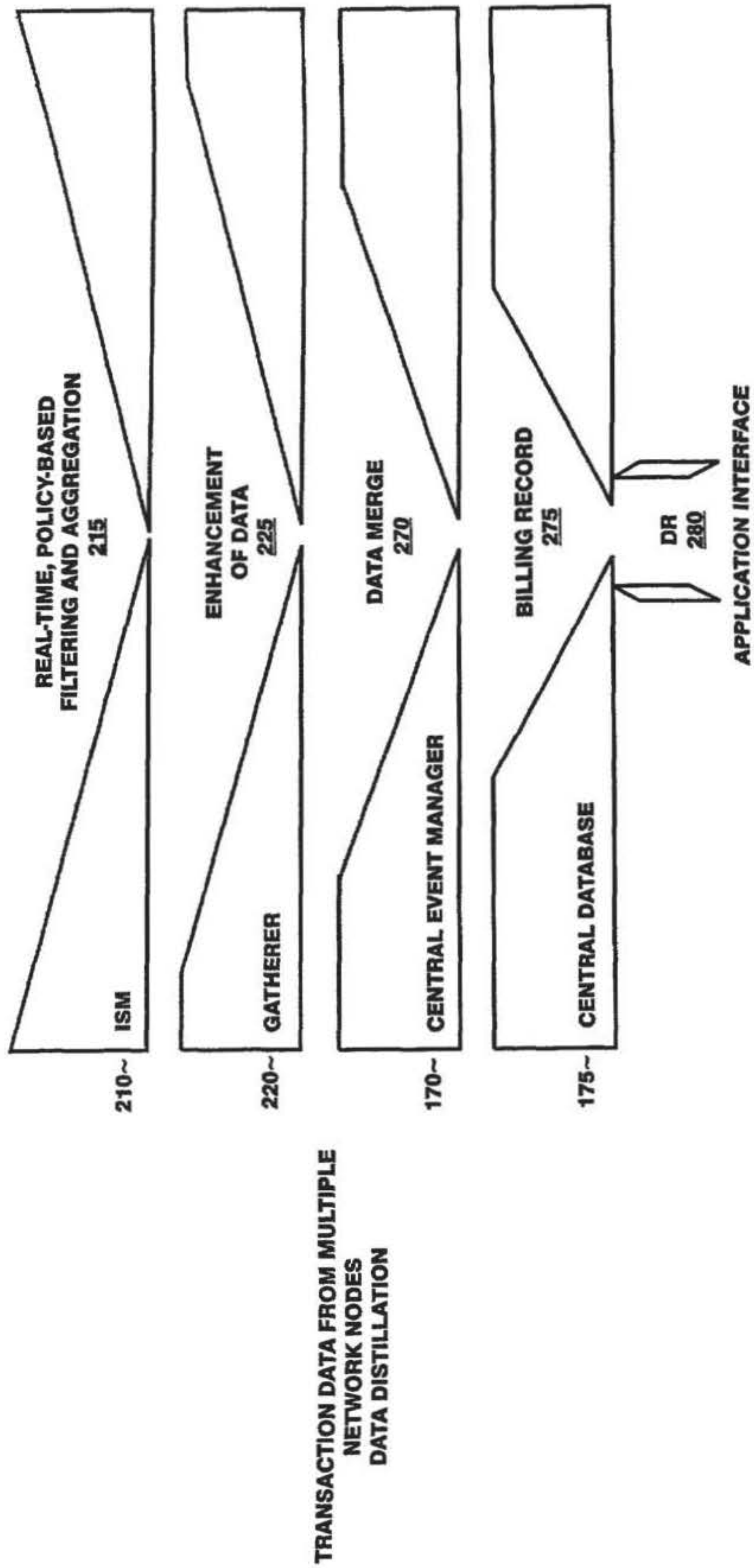

REAL-TIME, POLICY-BASED FILTERING AND AGGREGATION
215
ISM
210~
ENHANCEMENT OF DATA
225
GATHERER
220~
DATA MERGE
270
CENTRAL EVENT MANAGER
170~
BILLING RECORD
275
CENTRAL DATABASE
175~
DR
280
APPLICATION INTERFACE
290
TRANSACTION DATA FROM MULTIPLE NETWORK NODES
DATA DISTILLATION

FIG. 2

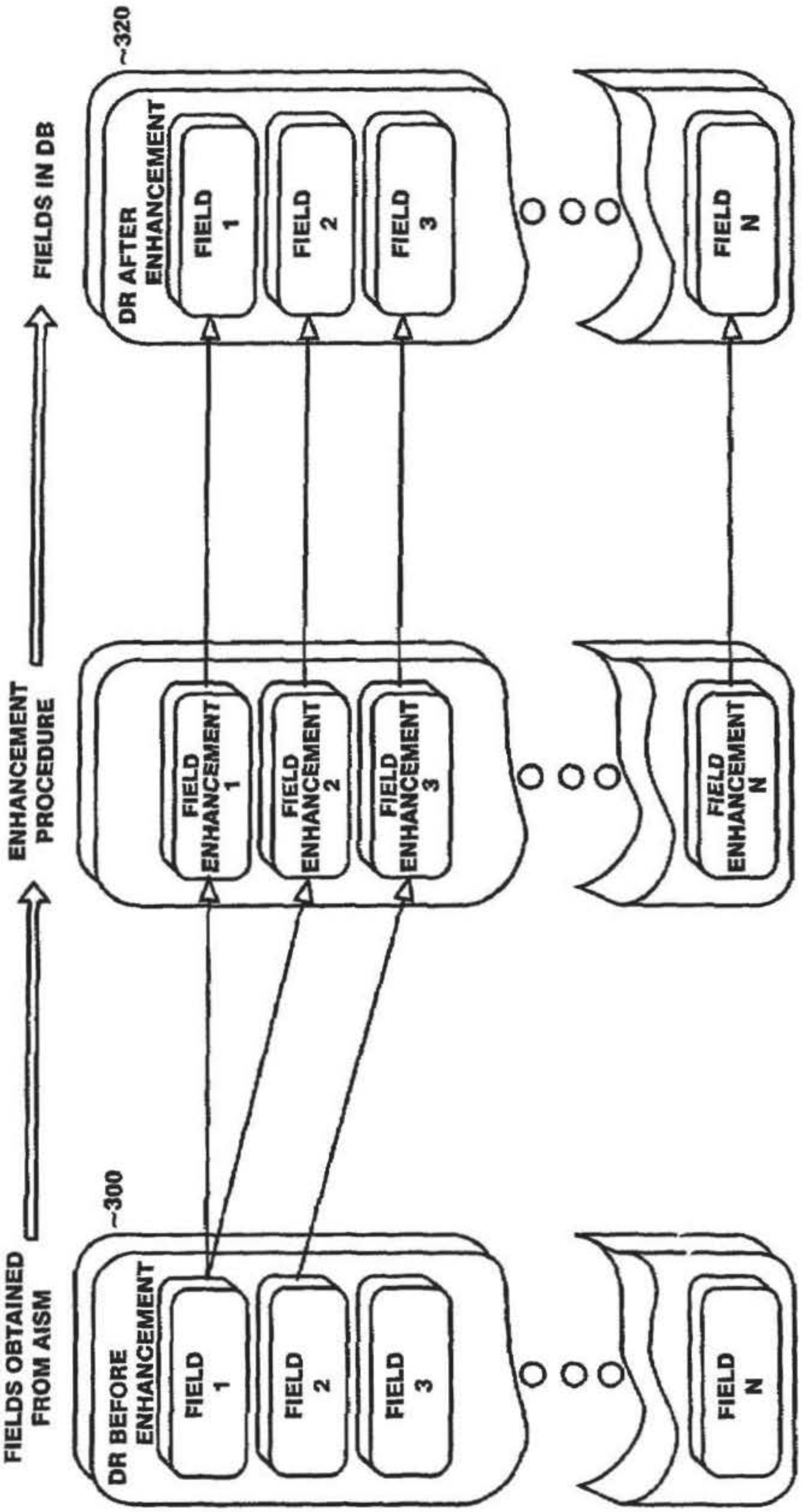

FIELDS OBTAINED FROM AISM
ENHANCEMENT PROCEDURE
FIELDS IN DB
300
DR BEFORE ENHANCEMENT
FIELD 1
FIELD 2
FIELD 3
FIELD N
FIELD ENHANCEMENT 1
FIELD ENHANCEMENT 2
FIELD ENHANCEMENT 3
FIELD ENHANCEMENT N
320
DR AFTER ENHANCEMENT
FIELD 1
FIELD 2
FIELD 3
FIELD N

FIG. 3

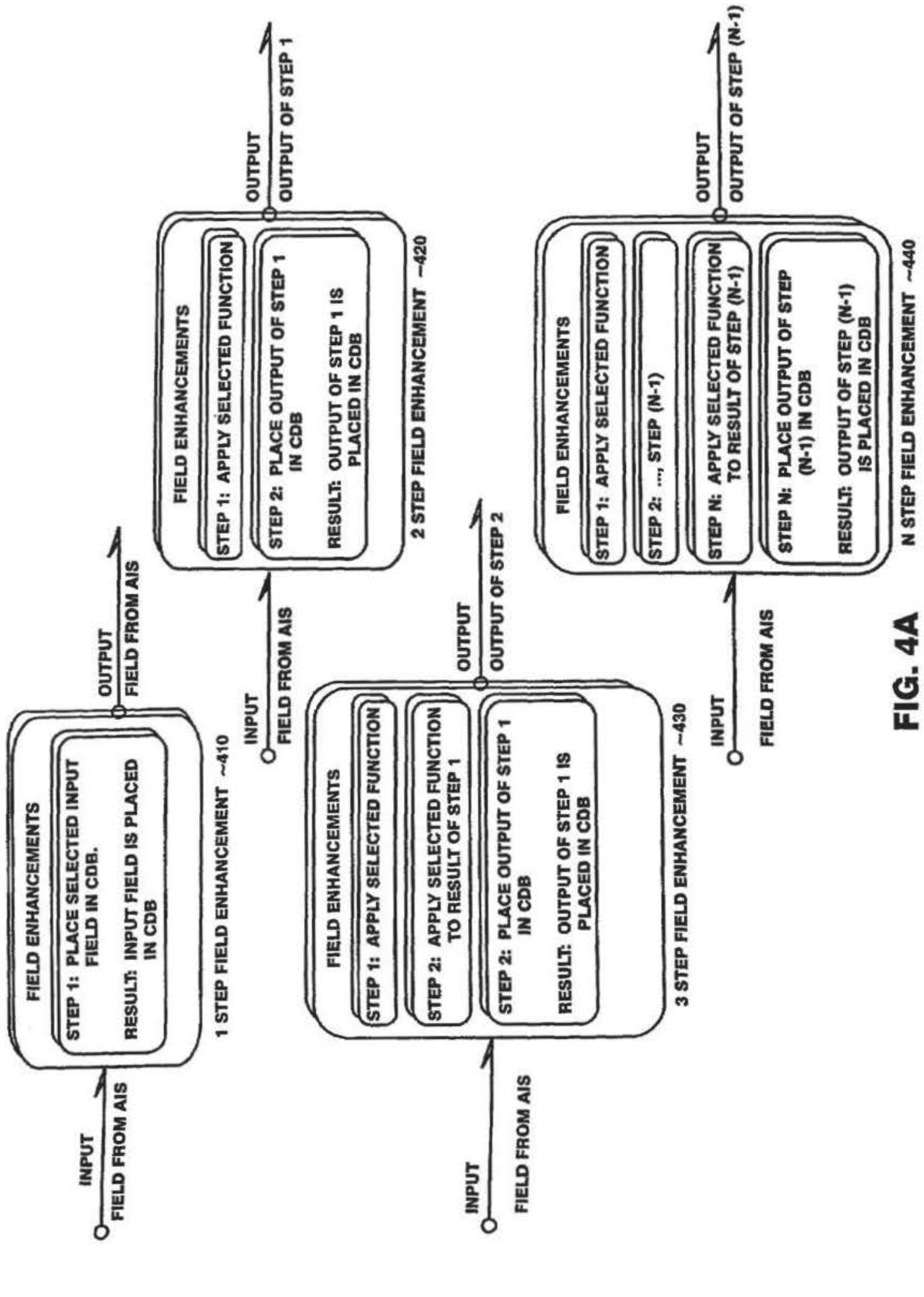

INPUT
FIELD FROM AIS
FIELD ENHANCEMENTS
STEP 1: PLACE SELECTED INPUT FIELD IN CDB.
RESULT: INPUT FIELD IS PLACED IN CDB
OUTPUT
FIELD FROM AIS
1 STEP FIELD ENHANCEMENT ~410
INPUT
FIELD FROM AIS
FIELD ENHANCEMENTS
STEP 1: APPLY SELECTED FUNCTION
STEP 2: PLACE OUTPUT OF STEP 1 IN CDB
RESULT: OUTPUT OF STEP 1 IS PLACED IN CDB
OUTPUT
OUTPUT OF STEP 1
2 STEP FIELD ENHANCEMENT ~420
INPUT
FIELD FROM AIS
FIELD ENHANCEMENTS
STEP 1: APPLY SELECTED FUNCTION
STEP 2: APPLY SELECTED FUNCTION TO RESULT OF STEP 1
STEP 2: PLACE OUTPUT OF STEP 1 IN CDB
RESULT: OUTPUT OF STEP 1 IS PLACED IN CDB
OUTPUT
OUTPUT OF STEP 2
3 STEP FIELD ENHANCEMENT ~430
INPUT
FIELD FROM AIS
FIELD ENHANCEMENTS
STEP 1: APPLY SELECTED FUNCTION
STEP 2: ..., STEP (N-1)
STEP N: APPLY SELECTED FUNCTION TO RESULT OF STEP (N-1)
STEP N: PLACE OUTPUT OF STEP (N-1) IN CDB
RESULT: OUTPUT OF STEP (N-1) IS PLACED IN CDB
OUTPUT
OUTPUT OF STEP (N-1)
N STEP FIELD ENHANCEMENT ~440

FIG. 4A

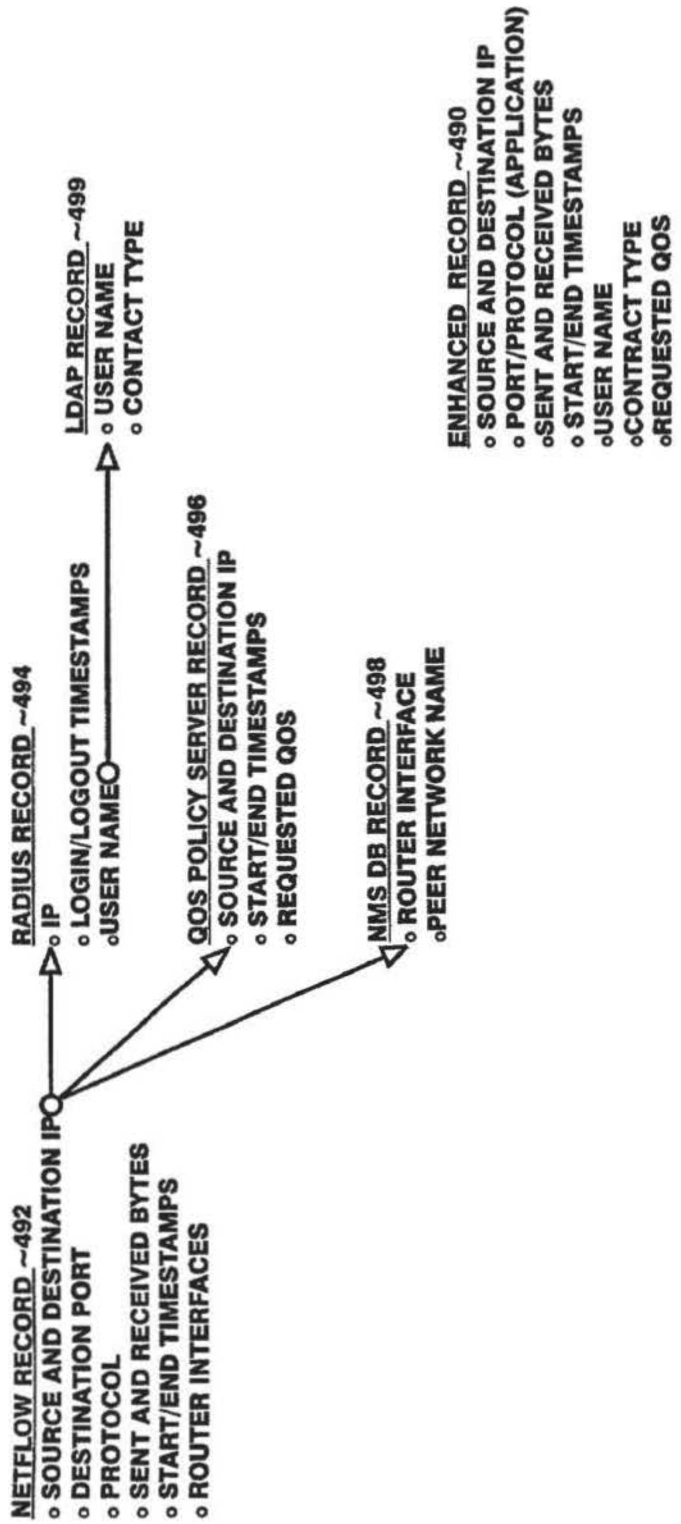

NETFLOW RECORD ~492
∘ SOURCE AND DESTINATION IP
∘ DESTINATION PORT
∘ PROTOCOL
∘ SENT AND RECEIVED BYTES
∘ START/END TIMESTAMPS
∘ ROUTER INTERFACES
RADIUS RECORD ~494
∘ IP
∘ LOGIN/LOGOUT TIMESTAMPS
∘ USER NAME
LDAP RECORD ~499
∘ USER NAME
∘ CONTACT TYPE
QOS POLICY SERVER RECORD ~496
∘ SOURCE AND DESTINATION IP
∘ START/END TIMESTAMPS
∘ REQUESTED QOS
NMS DB RECORD ~498
∘ ROUTER INTERFACE
∘ PEER NETWORK NAME
ENHANCED RECORD ~490
∘ SOURCE AND DESTINATION IP
∘ PORT/PROTOCOL (APPLICATION)
∘ SENT AND RECEIVED BYTES
∘ START/END TIMESTAMPS
∘ USER NAME
∘ CONTRACT TYPE
∘ REQUESTED QOS

FIG. 4B

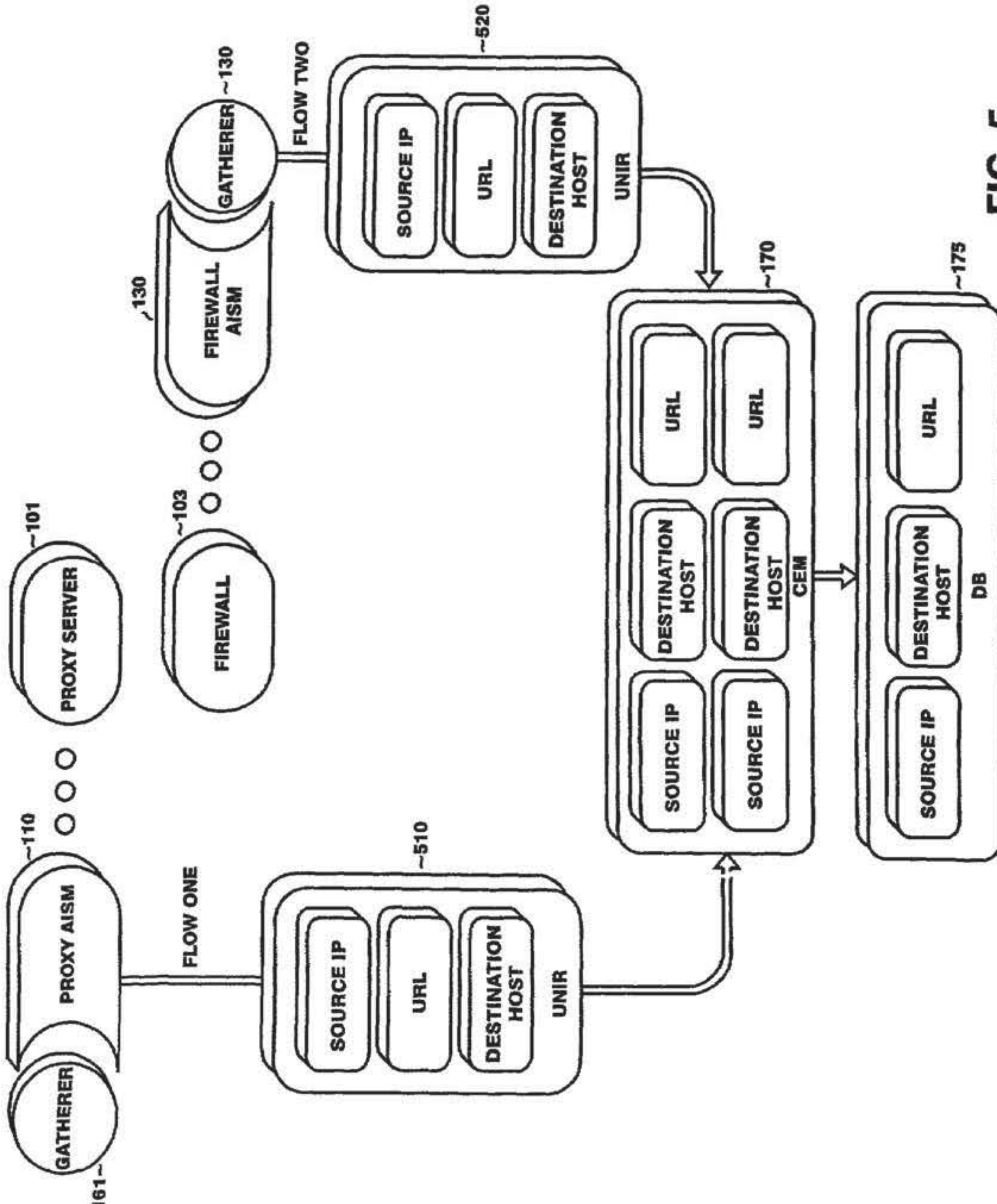

GATHERER
161
PROXY AISM
110
PROXY SERVER
101
FIREWALL
103
FIREWALL AISM
130
GATHERER
130
FLOW ONE
FLOW TWO
SOURCE IP
URL
DESTINATION HOST
UNIR
510
SOURCE IP
URL
DESTINATION HOST
UNIR
520
SOURCE IP
DESTINATION HOST
URL
SOURCE IP
DESTINATION HOST
URL
CEM
170
SOURCE IP
DESTINATION HOST
URL
DB
175

FIG. 5

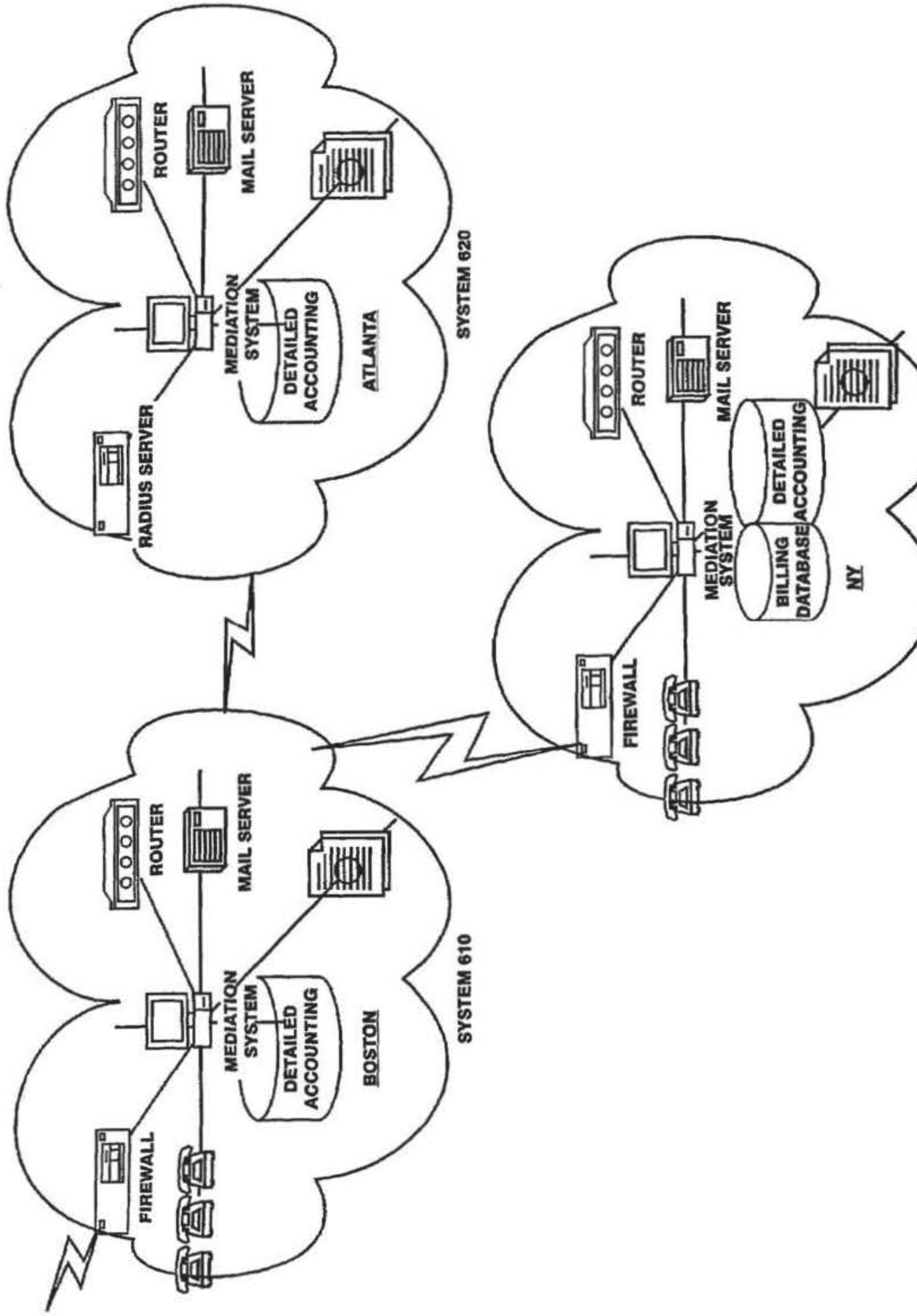

ROUTER
MAIL SERVER
RADIUS SERVER
MEDIATION SYSTEM
DETAILED ACCOUNTING
ATLANTA
SYSTEM 620
ROUTER
MAIL SERVER
FIREWALL
MEDIATION SYSTEM
DETAILED ACCOUNTING
BOSTON
SYSTEM 610
ROUTER
MAIL SERVER
FIREWALL
MEDIATION SYSTEM
BILLING DATABASE
DETAILED ACCOUNTING
NY
SYSTEM 630

FIG. 6

SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR MERGING DATA IN A NETWORK-BASED FILTERING AND AGGREGATING PLATFORM

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 09/442,876, filed Nov. 11, 1999, titled NETWORK ACCOUNTING AND BILLING SYSTEM AND METHOD, now U.S. Pat. No. 6,418,467.

The present application claims priority of a PCT application filed Nov. 20, 1998 under Ser. No. PCT/US98/24963, a first provisional patent application filed Nov. 20, 1997 under Ser. No. 60/066,898, and a second provisional patent application filed Nov. 19, 1998 under Ser. No. 60/109,095.

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BACKGROUND OF THE INVENTION

A. Field of the Invention

This invention relates to the field of computer networks. In particular, the invention relates to accounting and billing for services in a computer network.

B. Description of the Related Art

The low cost of Internet connectivity and a wide range of services are driving and more people onto the Internet, which is driving the deployment of TCP/IP networks. This process has led to a new market of client-server applications that enables the user to interact with other users and computer systems around the world. The use of these applications is consuming more and more Intranet and Internet bandwidth.

New applications such as "voice over IP (Internet Protocol)" and streaming audio and video require even more bandwidth and a different quality of service than email, or other less real-time applications. Also, the type quality of service can vary according to the needs of the user. For example, typically, businesses do not tolerate unavailable network services as easily as consumers. Internet Service Providers (ISPs) therefore would like to price their available bandwidth according to a user's needs. For example, flat monthly pricing may be the best billing model for consumers, but businesses may want to be billed according to their used bandwidth at particular qualities of service.

As ISPs continue to differentiate themselves by providing additional services, enterprise information technology managers will face similar problems to account for the escalating Intranet operating costs.

Therefore, ISPs and enterprise information technology managers will want to account for session logging, bandwidth usage, directory data and application session information from a variety of sources.

Due to the diversity of IP data sources (e.g., routers, hubs etc.), the need for effect tracking far exceeds the problems addressed by telephone companies. Telephone companies track information such as circuit usage so it can be correlated with account information. For example, businesses may use leased lines, consumers may have "Friends and Family" plans, cellular phones have different roamer fees according to the location of the user, etc. Typically, the phone company captures all of the data and uses batch processing to aggregate the information into specific user accounts. For example, all the long distance calls made during a billing period are typically correlated with the Friends and Family list for each phone account at the end of a billing period for that account. This requires a significant amount of computing power. However, this type of problem is significantly simpler than attempting to track and bill for every transaction in an IP network. Therefore, what is desired is a system that allows for accounting and billing of transactions on EP based networks.

The problem is even more difficult in IP network traffic because the information sources can exist and many different levels of the OSI network model, throughout heterogeneous networks. Potential sources of information include packet use from routers, firewall authentication logging, email data, ISP session logging, and application layer use information. Therefore, what is desired is a system and method that track IP network usage information across multiple layers of the OSI network model.

SUMMARY OF THE INVENTION

A network accounting and billing system and method are described. In some embodiments, the system can access any network related information sources such as traffic statistics provided by routers and switching hubs as well as application server access logs. The information can be accumulated in a central database for creating auditing, accounting and billing reports. Alternatively, the information can be sent directly to other systems such as rating engines used in customer care and billing systems.

In one embodiment, network traffic information is captured at network information sources (examples of information sources include network devices). These sources provide detailed information about the network communications transactions at a network device. Importantly, different types of sources can provide different types of information. Gatherer devices gather the detailed information from the various information source devices and convert the information into standardized information. The gatherer devices can correlate the gathered information with account information for network transaction accounting. Manager devices manage the gatherer devices and store the gathered standardized information. The manager devices eliminate duplicate network information that may exist in the standardized information. The manager devices also consolidate the information. Importantly, the information stored by the manager devices represents the consolidated, account correlated, network transaction information used for billing. In addition to account information, transaction information can be correlated to other information such as geography information (e.g., the location of an accessed server) and/or transaction routing information (as may be used in peering agreements between Internet Service Providers). The system thereby provides a distributed network accounting and billing system.

In some embodiments, the gatherer devices can access sources through proxy gateways, firewalls, and/or address translation barriers.

In some embodiments, the gatherer devices can correlate the information about a specific transaction with a particular account by accessing the transaction's source and/or destination information. The source and/or destination information is then correlated with account information from an account information database.

BRIEF DESCRIPTION OF THE FIGURES

The figures illustrate the invention by way of example. The invention is not meant to be limited to only those embodiments of shown in the Figures. The same reference in different figures indicates the same element is being used in those figures.

FIG. **1** illustrates a system including one embodiment of the invention.

FIG. **2** illustrates an example of the data distillation used in the system of FIG. **1**.

FIG. **3** illustrates data enhancements used in the data distillation.

FIG. **4**A illustrates example field enhancements that can be included in the data enhancements.

FIG. **4**B illustrates the creation of an enhanced record.

FIG. **5** illustrates an example record merge.

FIG. **6** illustrates an example of an alternative embodiment of the system.

DETAILED DESCRIPTION

A. System Overview

One embodiment of the system includes a multi-source, multi-layer network usage metering and mediation solution that gives Network Service Providers (NSPs), including Internet Service Providers (ISPs) and enterprise network(Intranet) operators, the information needed to set the right-price for IP (Internet Protocol) services. With the system, the providers can generate accurate usage-based billing and implement usage-based charge-back models. The system derives IP session and transaction information, collected in real time, from a multitude of network elements. The system gathers, correlates, and transforms data from routers, switches, firewalls, authentication servers, LDAP, Web hosts, DNS, and other devices to create comprehensive usage and billing records.

The system transforms raw transaction data from network devices into useful billing records though policy-based filtering, aggregation, and merging. The result is a set of detail records (DRs). In some embodiments, the detail records are XaCCT Detail Records (XDRs™) available from XaCCT Technologies. DRs are somewhat similar in concept to the telephony industry's Call Detail Records (CDRs). Thus, DRs can be easily integrated with existing Customer Care and Billing (CCB) systems.

In addition to billing data, DRs enable NSPs to deploy new services based on documented usage trends, plan network resource provisioning, and audit service usage. The system provides a clear picture of user-level network service use by tracking a variety of metrics such as actual session Quality of Service (QoS),traffic routes, and end-user application transactions.

The system is based on a modular, distributed, highly scaleable architecture capable of running on multiple platforms. Data collection and management is designed for efficiency to minimize impact on the network and system resources.

The system minimizes network impact by collecting and processing data close to its source. Modular architecture provides maximum configuration flexibility, and compatibility with multiple network information sources.

The system, or other embodiments, may have one or more of the following features.

Data collection can be from a wide range of network devices and services, spanning all layers of the network—from the physical to the application layer.

Real-time, policy-based filtering, aggregation, enhancement and merging creates accurate, detailed and comprehensive session detail records (DRs).

Real time correlation of data from various sources allows billing record enhancement.

Leverages existing investment through integration with any customer care & billing solution, reducing costs, minimizing risks and shortened time-to-market.

Non-intrusive operation eliminates any disruption of network elements or services.

Web-based user interface allows off-the-shelf browsers to access the system, on-demand, locally or remotely.

Carrier-class scalability allows expansion to fit an NSPs needs without costly reconfiguration.

Distributed filtering and aggregation eliminates system capacity bottlenecks.

Efficient, centralized system administration allows on-the-fly system reconfigurations and field upgrades.

Customized reporting with built-in report generation or an NSPs choice of off-the-shelf graphical reporting packages.

Comprehensive network security features allow secure communication between system components and multiple levels of restricted access.

B. System Details

The following describes the system **100** of FIG. **1**. The system **100** allows NSPs to account for and bill for IP network communications. The following paragraphs first list the elements of FIG. **1**, then describes those elements and then describes how the elements work together. Importantly, the distributed data gathering, filtering and enhancements performed in the system **100** enables load distribution. Granular data can reside in the peripheries of the system **100**, close to the information sources. This helps avoids reduce congestion in network bottlenecks but still allows the data to be accessible from a central location. In previous systems, all the network information flows to one location, making it very difficult to keep up with the massive record flows from the network devices and requiring huge databases.

The following lists the elements of FIG. **1**. FIG. **1** includes a number of information source modules (ISMs) including an ISM **110**, an ISM **120**, an ISM **130**, an ISM **136**, an ISM **140**, and an ISM **150**. The system also includes a number of network devices, such as a proxy server **101**, a DNS **102**, a firewall **103**, an LDAP **106**, a CISCO NetFlow **104**, and a RADIUS **105**. The system also includes a number of gatherers, such as a gatherer **161**, a gatherer **162**, a gatherer **163**, a gatherer **164**, and a gatherer **165**. The system of FIG. **1** also includes a central event manager (CEM) **170** and a central database (repository) **175**. The system also includes a user interface server **185** and a number terminals or clients **180**.

This paragraph describes how the elements of FIG. **1** are coupled. The various network devices represent devices coupled to an IP network such as the Internet. The network devices perform various functions, such as the proxy server **101** providing proxy service for a number of clients. Each network device is coupled to a corresponding ISM. For example, the proxy server **101** is coupled to the ISM **110**. The DNS **102** is coupled to the ISM **120**. The firewall **103** is coupled to the ISM **130**. The ISM **136** is coupled to the LDAP **106**. The ISM **140** is coupled to the CISCO NetFlow **104**. The ISM **150** is coupled to the RADIUS **105**. Each gatherer is associated with at least one ISM. Thus, the gatherer **161** is associated with the ISM **110** and is therefore coupled to that

ISM. The gatherer **162** is coupled to the ISM **120**. The gatherer **163** is coupled to the ISM **130** and the ISM **136**. The gatherer **164** is coupled to the ISM **140**. The gatherer **165** is coupled to the ISM **150**. The various gatherers are coupled to the CEM **170**. The user interface server is coupled to the terminals **180** and the CEM **170**.

The following paragraphs describe each of the various elements of FIG. **1**.

Network Devices

The network devices represent any devices that could be included in a network. (Throughout the description, a network device, unless specifically noted otherwise, also refers to an application server.) A network device represents a subset of information sources that can be used by the system **100**. That is, the network devices are merely representative of the types of sources of information that could be accessed. Other devices such as on-line transaction processing databases can be accessed in other embodiments of the invention. Typically, the network devices keep logging and statistical information about their activity. A network information source can be the log file of a mail server, the logging facility of a firewall, a traffics statistics table available on a router and accessible through SNMP, a database entry accessible through the Internet, an authentication server's query interface, etc. The network devices represent the information sources accessed by the ISMs.

Each type of network device can be accessing using a different method or protocols. Some generate logs while others are accessible via SNMP, others have proprietary APIs or use other protocols.

ISMs

The ISMs act as an interface between the gatherers and the network devices enabling the gatherers to collect data from the network devices. Thus, the ISMs represent modular, abstract interfaces that are designed to be platform-neutral. The information source modules act as interfaces or "translators", sending IP usage data, in real time, from the network devices to the gatherers. Each ISM is designed for a specific type of network data source. (In other embodiments, some ISM are generic in that they can extract information from multiple network devices). ISMs can be packaged separately, allowing NSPs to customize ISM configurations to meet the specific requirements of their network. For example, in the system of FIG. **1**, if the NSP did not have Cisco NetFlow devices, then the ISM **140** would not have to be included.

The ISMs can communicate with its corresponding network device using protocols and formats such as UDP/IP, TCP/IP, SNMP, telnet, file access, ODBC, native API, and others.

In some embodiments, the reliability of system **100** is enhanced through on-the-fly dynamic reconfiguration, allowing the NSP to add or remove modules without disrupting ongoing operations. In these embodiments, the CEM **170** can automatically update the ISMs.

The following ISMs are available in some embodiments of the invention.

- Categorizer—Classifies a session to a category according to user-defined Boolean expression.
- DNS (e.g. ISM **120**)—Resolves host names and IP addresses.
- Generic Proxy Server (e.g., ISM **110**)—Collects data from access logs in a common log format.
- Port/Protocol Resolution—Converts protocol/port information to account names and vice versa.
- CheckPoint FireWall-**1**—Collects data from FireWall-**1** accounting log and security log.
- Cisco IOS IP Accounting—Collects accounting data from a Cisco router using IOS IP accounting.
- Cisco NetFlow Switching—Collects session data from a Cisco router via NetFlow switching.
- Netscape Proxy Server—Collects data from a Netscape Proxy Server.
- Microsoft Proxy Server—Collects data from a Microsoft Proxy Server.

ISMs can be synchronous, asynchronous or pipe.

The data from an asynchronous ISM is dynamic so that the asynchronous ISM reacts to the information and relays it to the associated gatherer without prompting from other information sources in the system **100**. If the firewall **103** were a CheckPoint-FireWall-**1**, then the ISM **130** would be an example of an asynchronous ISM. When a network session is initiated, the details are recorded by the FireWall-**1 103**. The corresponding ISM **130** receives the details and passes them on automatically to the gatherer **163**.

Synchronous ISMs provide its information only when accessed by a gatherer. The ISM **120** is an example of a synchronous ISM. The DNS server **102** maintains information matching the IP addresses of host computers to their domain addresses. The ISM **120** accesses the DNS server **102** only when the ISM **120** receives a request from the gather **162**. When the DNS server **102** returns a reply, the ISM **120** relays the reply information to the gatherer **162**.

Pipe ISMs operate on record flows (batches of records received from information sources). Pipe ISMs process one or more enhancement flows the records as the flows arrive. The pipe ISM may initiate new record flows or may do other things such as generate alerts or provision network elements to provide or stop services. The pipe is implemented as an ISM to keep the internal coherency and logic of the architecture. (Record flows can terminate in a database or in a pipe ISM. The pipe ISM can perform filtering and aggregation, send alarms, or act as a mediation system to provision network elements when some event occurs or some accumulated value is surpassed. Specifically, pipe ISMs can act to enable pre-payment systems to disable certain services such as a voice IP call, when the time limit is surpassed or amount of data is reached.)

The gatherers can include caches and buffers for storing information from the ISMs. The buffers allow the gatherers to compensate for situations where there is a loss of connection with the rest of the system **100**. The cache sizes can be remotely configured. The cache minimizes the number of accesses to the Information Source.

ISM queries can be cached and parallelized. Caching of synchronous ISM queries provides for fast responses. Parallelizing queries allows for multiple queries to be processed at the same time.

Gatherers

The gatherers gather the information from the ISMs. In some embodiments, the gatherers are multi-threaded, lightweight, smart agents that run on non-dedicated hosts, as a normal user application on Windows NT or Unix, as a background process, or daemon. What is important though is that the gatherers can be any hardware and/or software that perform the functions of a gatherer.

The gatherers can be installed on the same network segment as the network device such as router and switch or on the application server itself. This placement of a gatherer minimizes the data traffic impact on the network.

The gatherers collect network session data from one or more ISMs. Session data can be sent to another gatherer for enhancement or to the CEM **170** for merging and storing in

the central database **170**. The gatherers can be deployed on an as needed basis for optimal scalability and flexibility.

The gatherers perform flexible, policy-based data aggregation. Importantly, the various types of ISMs provide different data and in different formats. The gatherers normalize the data by extracting the fields needed by the CEM **170** and filling in any fields that may be missing. Thus, the gatherers act as a distributed filtering and aggregation system. The distributed data filtering and aggregation eliminates capacity bottlenecks improving the scalability and efficiency of the system **100** by reducing the volume of data sent on the network to the CEM **170**.

Aggregation can be done by accumulating groups of data record flows, generating a single data record for each group. That single record then includes the aggregated information. This reduces the flow of the data records.

Filtering means discarding any record that belongs to a group of unneeded data records. Data records are unneeded if they are known to be collected elsewhere. A policy framework enables the NSP to configure what to collect where.

Filtering and/or aggregation can be done at any point along a data enhancement (described below) so that aggregation schemes can be based on enhanced data records as they are accumulated. The filtering and/or aggregation points are treated by the system **100** as pipe ISMs which are flow termination and flow starting points (ie: like an asynchronous ISM on the starting end and like a database on the terminating end). Data enhancement paths and filtering and/or aggregation schemes can be based on accumulated parameters such as user identification information and a user's contract type.

As noted above, the PISM can be used in the context of filtering and/or aggregation. One or more record flows can terminate at the PISM and can be converted into one or more new record flows. Record flows are grouped based on matching rules that apply to some of the fields in the record flows, while others are accumulated or undergo some other operation such as "maximum" or "average". Once the groups of accumulated records have reached some threshold, new accumulated records are output. This can be used for example in order to achieve a business-hybrid filtering and aggregation data reduction by imposing the business rules or the usage-based products that are offered to the customer, onto the record flows as they are collected in real-time. This is done instead of previous system where the information is stored in a database and then database operations are performed in order to create bills or reports. The filtering and aggregation reduces the amount of data that is stored in the central database **175** while not jeopardizing the granularity of data that is necessary in order to create creative usage-based products.

Typically, data collected from a single source does not contain all the information needed for billing and accounting, such as user name and organization. In such cases, the data is enhanced. By combining IP session data from multiple sources, such as authentication servers, DHCP and Domain Name servers, the gatherers create meaningful session records tailored to the NSP's specific requirements. In the example of FIG. **1**, the gatherer **161** can provide information to the gatherer **162** so that the source IP address for an Internet session from the proxy server **101** can be combined with the domain address from the DNS server **102**.

The enhancement procedure can be triggered by an asynchronous ISM. The information from the asynchronous ISM is associated with field enhancements in the central database **175**. A field enhancement defines how a field in the central database is filled from the source data obtained from the asynchronous ISM. Through the field enhancements, the missing parameters are added to a record using the data collected from one or more synchronous ISMs. Enhancements are described in detail below.

The gatherers can include caches and buffers for storing information from the ISMs. The buffers allow the gatherers to compensate for situations where there is a loss of connection with the rest of the system **100**. The caches can reduce the number of accesses to an information source. The buffer and/or cache sizes can be remotely configured.

Central Event Manager (CEM)

The Central Event Manager (CEM) **170** acts as the central nervous system of the system **100**, providing centralized, efficient management and controls of the gatherers and the ISMs.

The CEM **170** can perform one or more of the following tasks:

Coordinates, controls, and manages the data collection process. The CEM **170** coordinates the operation of the gatherers and manages the flow of data through the system **100** through the collection scheme defined in the system configuration. The latter includes the configuration of the gatherers, the ISMs, the network devices, the fields in the central database **175** (described below), and the enhancement procedures. Based on the collection scheme the CEM **170** determines the system **100**'s computation flow (the set of operations the system **100** must perform to obtain the desired information). The CEM **170** then controls all the gatherers, instructing them to perform, in a particular sequence, the operations defined in the computation flow. The CEM **170** receives the records collected by the gatherers and stores them in the central database **175**. NSPs can configure the CEM **170** to merge duplicate records before storing them in the central database **175**. Record merging is described below.

Performs clean-up and aging procedures in the database **175**. The system **100** collects and stores large amounts of session information every day. The CEM **170** removes old data to free space for new data periodically. The NSP defines the expiration period for the removal of old records. The CEM **170** is responsible for coordinating the removal of records from the central database **175**. The CEM **170** places a time stamp on every record when the record enters the central database **175** and deletes the record after the time period the NSP has defined elapses.

Provides centralized system-wide upgrade, licensing, and data security.

The NSP can perform version upgrades of the system **100** at the CEM **170**. The gatherers can be automatically upgraded once a new version is installed on the host computer of the CEM **170**. ISMs are also installed via the CEM **170** and exported to the gatherers. The CEM **170** maintains a list of licenses installed in the system and verifies periodically if the system is properly licensed. This feature lets the NSP centrally install and uninstall licenses. It also prevents unlicensed use of the system **100** and any of its components.

Monitors the state of the gatherers and ISMs. The gatherers periodically communicate with the CEM **170**. The CEM **170** continuously monitors the state of each gatherer and network devices in the system **100**. The CEM **170** can be fault-tolerant, that is, it can recover from any system crash. It coordinates the recovery of the system **100** to its previous state.

Central Database

The central database **175** is the optional central repository of the information collected by the system **100**. The central database **175** is but one example of a sink for the data generated in the system **100**. Other embodiments include other configurations. The central database **175** stores and maintains the data collected by the gatherers, as well as the information on the configuration of the system **100**. Thus, in configuring the system **100**, the NSP defines what data will be stored in each field in the central database **175** and how that data is collected from the ISMs.

The information on network sessions is stored in the database in the form of a table. Each field in the table represents a network session parameter. Each record describes a network session. The system **100** has a set of pre-defined fields that are configured by the CEM **170** on installation. The NSP can modify the central database **175** structure by adding, deleting, or modifying fields. The NSP access the data in the central database **175** by running queries and reports. The old data is removed from the central database **175** to free space for new data periodically. You can specify the time interval for which records are stored in the central database **175**. The structure of the central database **175** with some of the predefined fields is illustrated in the following figure.

As each IP session may generate multiple transaction records, during the merge process the CEM **170** identifies and discards duplications, enhancing the efficiency of the data repository. Generally, data records are passed through the merger program, in the CEM **170**, into the central database **175**. However, the data records are also cached so that if matching records appear at some point, the already stored records can be replaced or enhanced with the new records. The database tables that contain the record flows can be indexed, enhancing the efficiency of the data repository. A merge is achieved by matching some of the fields in a data record and then merging the matching records from at least two record flows, transforming them into one record before updating the central database **175**. In some embodiments, adaptive tolerance is used to match records. Adaptive tolerance allows for a variation in the values of fields that are compared (e.g., the time field value may be allowed to differ by some amount, but still be considered a match). The adaptive aspect of the matching can include learning the appropriate period to allow for the tolerance. The reason that the records that do not match any previous records are sent through into the central database **175**, in addition to being cached for later matching, is to avoid loss of data in case of system failure.

The following table illustrates an example of the types of records stored in the central database **175** by the CEM **170**.

The system **100** supports a non-proprietary database format enabling the central database **175** to run on any of a number of commercially available databases (e.g., MS-SQL Server, Oracle Server, DB2, etc.).

User Interface Server and Clients

The User Interface Server (UIS) **185** allows multiple clients (e.g. terminals **180**) to access the system **100** through, the Microsoft Internet Explorer with Java™ Plug-in or Netscape Navigator with Java™ Plug-in. Other embodiments can use other applications to access the system **100**. The main function of the UIS **185** is to provide remote and local platform independent control for the system **100**. The UIS **185** can provide these functions through windows that correspond to the various components of the system **100**. Access to the system **100** can be password protected, allowing only authorized users to log in to the system and protecting sensitive information.

The NSP can perform one or more of the following main tasks through the UIS **185**:

Configure the system **100**.

Create and run queries and reports on network activity and resource consumption.

Register and license the system **100**.

C. Data Distillation

FIG. **2** illustrates the data distillation process performed by the system of FIG. **1**. The data distillation aggregates and correlate information from many different network devices to compile data useful in billing and network accounting.

First, the ISMs **210** gather data from their corresponding network device. Note that for some ISMs (e.g. pipe ISMs), real-time, policy-based filtering and aggregation **215** can also be done. This data is then fed to the gatherers **220**. The gatherers **220** perform data enhancement to complete the data from the ISMs **210**. The results are provided to the CEM **170**. The CEM **170** performs data merges **270** to remove redundant data. The merged data is then optionally stored in the central database **175** as a billing record **275** or is sent directly to an external system. The billing record information can be accessed from external applications, through the application interface **290**, via a data record **280**. Filtering and/aggregation and/or data enhancements can be done at any stage in the system **100**.

D. Data Enhancement

As mentioned above, the gatherers **220** provide data enhancement features to complete information received from the ISMs **210**. The following describes some example data enhancement techniques used in some embodiments of the invention.

Source IP	Destination IP	Source Host	Destination Host	Service	Date/Time	Duran on	Total Bytes	Counter
199.203.132.187	204.71.177.35	pcLev.xacct.com	yahoo.com	http	Apr. 26, 1998 10:56:55	6464	435666	261019
199.203.132.131	207.68.137.59	prodigy.xacct.com	microsoft.com	telnet	Apr. 26, 1998 10:56:55	747	66743	261020
199.203.132.177	199.203.132.1	pcEitan.xacct.com	xpert.com	smtp	Apr. 26, 1998 10:56:55	82	55667	261021
199.203.132.173	204.162.80.182	pcAdi.xacct.com	cnet.com	http	Apr. 26, 1998 10:56:55	93	33567	261022

FIG. **3** illustrates an example of data enhancement. Data enhancement comprises a number of field enhancements. A field enhancement specifies how the data obtained from the trigger of the enhancement procedure is processed before it is placed in a single field in the central database **175**. The data can be placed in the field directly, or new information may be added to the record by applying a Synchronous ISM function. (In the example below, the function is "resolve the IP address to a host FQDN"). Field enhancements may involve one or multiple steps. There is no limit to the number of steps in a Field Enhancement. The data record starts with fields obtained from an asynchronous ISM **300**. The fields in the DR **300** are then enhanced using the field enhancements. The enhanced fields result in the DR **320**.

A visual representation of an enhancement can be presented to the NSP. The enhancement may include an itinerary of ISMs starting off with an AISM, passing through PISMs, and terminating in the CEM **170**. Using this view of the system **100**, the NSP need not be shown the actual flow of data since the flow may be optimized later in order to achieve better performance. This is more of a graphical logical view of how the enhancement is achieved in steps. (PISMs can terminate more than one flow and initiate more than one flow.)

A visual representation of a field enhancement shows the per-field flow of data correlation. This process ends in the CEM **170** or in a PISM. The NSP supplies information telling the system **100** how to reach each of the terminating fields (in the CEM **170** or the PISM) starting off from the initiating fields (PISM or AISM). Each step of enhancement defines cross correlation with some SISM function.

FIG. **4**A illustrates various field enhancements (**410** through **440**). A field enhancement includes applying zero or more functions to a field before storing the field in a specified field in the central database **175**.

One-step Field Enhancement **410**. The initial source data from the asynchronous ISM is placed directly in a field in the central database **175**. Example: the field enhancement for the Source IP field.

Two-step Field Enhancement **420**. The initial source data from the asynchronous ISM is used to obtain new additional data from a synchronous network device and the new data is placed in a field in the central database **175**. Example: the field enhancement for the Source Host field.

Three-step Enhancement **430**. The initial source data from the asynchronous ISM is used to obtain additional data from a synchronous ISM. The result is used to obtain more data from another ISM and the result is placed in a field in the central database **175**.

The following illustrates an example data enhancement. Suppose the data obtained from a proxy server **101** contains the source IP address of a given session, such as 199.203.132.2, but not the complete domain address of the host computer (its Fully Qualified Domain Name), such as www.xacct.com. The name of the host can be obtained by another network device—the Domain Name System (DNS **102**) server. The DNS-server **102** contains information that matches IP addresses of host computers to their Fully Qualified Domain Names (FQDNs). Through an enhancement procedure the information collected from the proxy server **101** can be supplemented by the information from the DNS **102**. Therefore, the name of the host is added to the data (the data record) collected from the proxy server **101**. The process of adding new data to the data record from different network devices can be repeated several times until all required data is collected and the data record is placed in the central database **175**.

FIG. **4**B illustrates another example data enhancement where an enhanced record **490** is created from an initial netflow record **492**. Fields in the enhanced record **490** are enhanced from the radius record **494**, the QoS policy server record **496**, the NMS DB record **498**, and the LDAP record **499**.

Defining Enhancement Procedures

The following describes the process for defining enhancement procedures in some embodiments of the system. Typically defining an enhancement procedures for the system **100** includes (1) defining enhancement procedures for each asynchronous ISM and (2) configuring field enhancements for all fields in the central database **175** for which the NSP wants to collect data originating from an asynchronous ISM that triggers the corresponding enhancement procedure.

An enhancement procedure can be defined as follows:

1. Access the CEM **170** using the UIS **180**.
2. Select the enhancement procedures list using the UIS **180**.
3. Define the name of the new enhancement procedure.
4. Select a trigger for the new enhancement procedure. The trigger can correspond to any asynchronous ISM in the system **100**. Alternatively, the trigger can correspond to any asynchronous ISM in the system **100** that has not already been assigned to an enhancement procedure.
5. Optionally, a description for the enhancement procedure can be provided.
6. The new enhancement procedure can then be automatically populated with the existing fields in the central database **175**. Optionally, the NSP can define the fields (which could then be propagated to the central database **175**). Alternatively, based upon the type of asynchronous ISM, a preset set of fields could be proposed to the NSP for editing. What is important is that the NSP can define field procedures to enhance the data being put into the data records of the central database **175**.
7. The NSP can then define the field enhancements for every field in the new enhancement procedure for which the NSP wants to collect data from the ISM that is the trigger of the new enhancement procedure.

Defining Field Enhancements

Defining a field enhancement involves specifying the set of rules used to fill a database field from the information obtained from the trigger of the enhancement procedure. The NSP defines field enhancements for each field in which NSP wants to collect data from the trigger. If no field enhancements are defined, no data from the trigger will be collected in the fields. For example, suppose the firewall asynchronous ISM **130** that triggers an enhancement procedure. Suppose the central database **175** has the following fields: source IP, source host, destination IP, destination host, user name, total bytes, service, date/time, and URL. If the NSP wants to collect session data for each field except the URL from the firewall ISM **130**, which triggers the enhancement procedure, the NSP defines a field enhancement for each field with the exception of the URL.

In some embodiments, the field enhancements are part of the enhancement procedure and the NSP can only define and modify them when the enhancement procedure is not enabled.

The field enhancements can be defined in a field enhancement configuration dialog box. The field enhancement configuration dialog box can have two panes. The first displays the name of the enhancement procedure, the name of its trigger, and the name and data type of the field for which the NSP is defining the field enhancement. The second is

dynamic and interactive. Its content changes depending on the NSP's input. When first displayed, it has two toggle buttons, End and Continue, and a list next to them. The content of the list depends on the button depressed.

When End is depressed, the list contains all output fields whose data type matches the data type of the field for which the NSP is defining the field enhancement. For example, if the field's data type is IP Address, the list contains all fields that are of the same type, such as source IP and destination IP that the AISM supplies. The fields in the list can come from two sources: (1) the source data which the gatherer receives from the trigger and (2) the result obtained by applying a synchronous ISM function as a preceding step in the field enhancement. The following notation is used for the fields:

OutputFieldName for the output of a field origination from the trigger

SISName.FunctionName(InputArgument). OutputField for the output of a field that is the result of applying a function

SISName . . . OutputField for the output of a field that is the result of applying a function as the final step of a field enhancement

The following examples are presented.

Source IP is the field provided by the trigger of the enhancement procedure that contains the IP address of the source host.

DNS . . . Host Name and DNS.Name(Source IP).Host name are the names of a field originating from the resolved function Name of a network device called DNS that resolves the IP address to a domain address. The input argument of the function is the field provided by the trigger of the enhancement procedure, called source IP. It contains the IP address of the source host. The function returns the output field called Host Name that contains the domain address of the source host. The notation DNS . . . Host Name is used when the field is the result of applying the function as the final step of a field enhancement. The notation is DNS.Name(Source IP).Host Name is used when the field is used as the input to another function.

In the user interface, if End is unavailable, none of the output fields matches the data type of the field.

When Continue is depressed, the list contains all applicable functions of the available synchronous network device configured in the system **100**. If the preceding output does not match the input to a function, it cannot be applied and does not appear on the list.

The following notation is used for the functions:

SISName.FunctionName(InputFieldName:InputFieldDataType) →(OutputFieldName:OutputFieldDataType)

When the function has multiple input and/or output arguments, the notation reflects this. The arguments are separated by commas.

The following example shows a field enhancement.

DNS. Address(Host Name:String)→(IP Address:IP Address)

Where DNS is the name of the synchronous ISM (or network device) as it appears in the system configuration.

Address is the name of the function.

(Host Name:String) is the input to the function—host FQDN of data type String

(IP Address:IP Address) is the output—IP address of data type IP Address

The NSP can define the field enhancement by choosing items from the list. The list contains the option <none> when the End button is depressed. Choosing this option has the same effect as not defining a field enhancement: no data from the trigger will be stored in the field in the central database **175**.

E. Record Merges

FIG. **5** illustrates an example record merge. Record merging removes duplicate records from the central database **175**.

The following example shows how merges work and illustrate, the need for merging duplicate records. Suppose the system **100** is using two asynchronous ISMs **110** and **130**. All outbound network traffic going through the proxy server **101** is routed through the firewall **103**. The firewall **103** records the proxy server **101** as the source of all sessions passing through the proxy server **101**, although they originate from different workstations on the network. At the same time, the proxy server **101** records the destination of all sessions as the firewall **103**, although their actual destinations are the different Internet sites.

Therefore, all sessions are logged twice by the system **100** and the records are skewed. The data from the firewall **103** indicates the destination of a given session, but not the source (see data record **520**), while the data from the proxy server **101** records the source, but not the destination (see data record **510**). Defining a merge eliminates the duplication of records.

A merge can be defined instructing the CEM **170** to store the destination data obtained from the firewall **103** and the source data from the proxy server **101** in the central database **175**. The merge will also eliminate the problem of skewed data by storing the correct source and destination of the session in the central database **175**. Both network devices provide information on the URL. The latter can be used to identify the fact that the two seemingly independent records (**510** and **520**) are actually two logs of the same session.

Two enhancement procedures are defined for the example of FIG. **5**. The trigger of the first, designated Flow One, is the Proxy Server Asynchronous Information Source Module. The trigger of the second, Flow Two, is the Firewall Asynchronous Information Source Module. The records from Flow One and Flow Two are records of the same session. They both have the same value for the URL field. Based on this value, the CEM **170** identifies the two records are double logs of the same session. It merges the two data records taking the Source IP value from Flow One and the Destination IP from Flow Two as the values to be stored in the central database **175**.

Defining Merges

The following describes defining merges. A merge is a set of rules that specify how duplicate records from multiple enhancement procedures must be identified and combined before being stored in the central database **175**. The NSP can merge the records from two or more enhancement procedures. To define a merge, the NSP identifies the following information.

The enhancement procedures included in the merge.

How to identify duplicate records (which fields of the records must match).

How to combine the records; that is, for each field, which value (from which enhancement procedure) must be stored in the central database **175**.

(Optional)

If the NSP does not specify how records must be combined, the records are merged as follows:

When the values in all but one of the fields are null, the non-null value is stored.

When the fields contain non-null values, the value of the first record received (chronologically) is stored.

F. Additional Embodiments

The following describes additional embodiments of the invention.

In some embodiments, the user interface used by an NSP to configure the system **100** can be presented as a graphical representation of the data enhancement process. Every step in the enhancement can be shown as a block joined to another block (or icon or some graphical representation). The properties of a block define the operations within the block. In some embodiments, the entire data enhancement process from network devices to the central database **175** can be shown by linked graphics where the properties of a graphic are the properties of the enhancement at that stage.

In some embodiments, multiple CEMs **170** and/or central databases **175** can be used as data sources (back ends) for datamart or other databases or applications (e.g., customer care and billing systems).

In some embodiments, the types of databases used are not necessarily relational. Object databases or other databases can be used.

In some embodiments, other platforms are used. Although the above description of the system **100** has been IP network focused with Unix or Windows NT systems supporting the elements, other networks (non-IP networks) and computer platforms can be used. What is important is that some sort of processing and storing capability is available at the gatherers, the CEMs, the databases, and the user interface servers.

In some embodiments, the gatherers and other elements of the system **100**, can be remotely configured, while in other embodiments, some of the elements need to be configured directly. For example, a gatherer may not be remotely configurable, in which case, the NSP must interface directly with the computer running the gatherer.

In other embodiments, the general ideas described herein can be applied to other distributed data enhancement problems. For example, some embodiments of the invention could be used to perform data source extraction and data preparation for data warehousing applications. The gatherers would interface with ISMs that are designed to extract data from databases (or other data sources). The gatherers would perform filtering and aggregation depending upon the needs of the datamart (in such an embodiment, the central database and CEM could be replaced with/used with a datamart). The data enhancement would then be done before storing the information in the datamart.

FIG. **6** illustrates a system **600** where multiple systems **100** are linked together. This system could be an ISPs point of presence accounting system. The system **620** and the system **610** can store detailed network accounting information in their local detailed accounting databases. This information can then be aggregated and sent over the more expensive long distance links to the billing database in the system **630**. Customer service information can still be accessed at the detailed accounting database, but the aggregated information may be all that is needed to create the bills.

Additional embodiments of the invention are described in the attached appendices A-F.

G. Conclusions

A network accounting and billing system and method has been described. In some embodiments, the system can access any network related information sources such as traffic statistics provided by routers and switching hubs as well as application server access logs. These are accumulated in a central database for creating auditing, accounting and billing reports. Because of the distributed architecture, filtering and enhancements, the system efficiently and accurately collects the network usage information for storage in a form that is useful for billing and accounting.

What is claimed is:

1. A computer program product embodied on a computer readable storage medium for processing network accounting information comprising:

computer code for receiving from a first source a first network accounting record;

computer code for correlating the first network accounting record with accounting information available from a second source; and

computer code for using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.

2. The computer program product embodied on a computer readable storage medium of claim **1**, wherein the enhancement is based on a policy.

3. The computer program product embodied on a computer readable storage medium of claim **2**, wherein the accounting information includes parameters and wherein the using comprises adding at least one parameter from the accounting information to the first network accounting record.

4. The computer program product embodied on a computer readable storage medium of claim **3**, wherein the accounting information is in the form of a second network accounting record.

5. The computer program product embodied on a computer readable storage medium of claim **4**, wherein the second source is a network source, further comprising:

computer code for receiving the second network accounting record from the second source.

6. The computer program product embodied on a computer readable storage medium of claim **3**, wherein the second source is a memory, further comprising:

computer code for providing the accounting information to the memory for storage.

7. A method of processing network accounting information comprising:

receiving from a first source a first network accounting record;

correlating the first network accounting record with accounting information available from a second source; and

using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.

8. The method of claim **7**, wherein the enhancement is based on a policy.

9. The method of claim **8**, wherein the accounting information includes parameters and wherein the using comprises adding at least one parameter from the accounting information to the first network accounting record.

10. The method of claim **9**, wherein the accounting information is in the form of a second network accounting record.

11. The method of claim **10**, wherein the second source is a network source, further comprising:

receiving the second network accounting record from the second source.

12. The method of claim **9**, wherein the second source is a memory, further comprising:

providing the accounting information to the memory for storage.

13. A system for collecting data from network entities for a data consuming application, comprising:

a plurality of data collectors to receive information from the network entities and to produce records based on the information, each data collector in the plurality of data

collectors being associated with and coupled to a different one of the network entities; and

an enhancement component that augments data in one of the records produced by one of the plurality of data collectors with data from a different one of the records produced by another of the plurality of data collectors.

14. The system of claim **13**, wherein the plurality of data collectors receive the records and correlate a first of the records with accounting information available from a second source and use the accounting information to enhance the first record.

15. The system of claim **14**, wherein the enhancement is based on a policy.

16. The system of claim **14**, wherein the accounting information includes parameters and the enhancement component adds at least one parameter from the accounting information to the first record.

17. The system of claim **13**, further comprising:

a module coupled to the plurality of data collectors, the module receives the records produced by the plurality of data collectors for aggregation purposes, and wherein the enhancement component resides in the module.

18. A method for collecting data from network entities for a data consuming application having a policy, comprising:

receiving a first network record and a second network record, each associated with a different network entity and including data parameters of the associated different network entity;

determining that the first and the second network records are related;

determining from the policy that the first network activity is to be enhanced with one of the data parameters from the second network record; and

adding the one of the data parameters from the second network record to the first network record.

19. The method of claim **18**, wherein adding is performed by an enhancement component that resides in a module capable of aggregation.

20. An apparatus for enhancing network accounting data records for an accounting data consuming application having a policy, the apparatus coupled to a plurality of data collectors, each data collector collecting data from a different network entity, comprising:

a memory device for storing accounting data records received from the plurality of data collectors;

wherein a new accounting data record is correlated with one of the stored accounting data records; and

an enhancement device, responsive to the policy, for augmenting the new accounting data record with data from one of the stored accounting data records with which the new accounting data record is correlated.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 7,631,065 B2
APPLICATION NO. : 10/012962
DATED : December 8, 2009
INVENTOR(S) : Schweitzer et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the cover page:

Title (54) and Col. 1, lines 1-4; please replace "SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR MERGING DATA IN A NETWORK-BASED FILTERING AND AGGREGATING PLATFORM" with --ENHANCEMENT OF NETWORK ACCOUNTING RECORDS--;

Inventors (75); please replace "**Limor Schweitzer**, Tel-Aviv (IL); **Eran Wagner**, Cupertino, CA (US); **Tal Givoly**, Cupertino, CA (US)" with --**Limor Schweitzer**, Santa Clara, CA (US); **Eran Wagner**, Los Altos, CA (US); **Tal Givoly**, Cupertino, CA (US)--.

In the Specification:

Col. 2, lines 25-66; please replace "A network accounting and billing system and method are described. In some embodiments, the system can access any network related information sources such as traffic statistics provided by routers and switching hubs as well as application server access logs. The information can be accumulated in a central database for creating auditing, accounting and billing reports. Alternatively, the information can be sent directly to other systems such as rating engines used in customer care and billing systems.

In one embodiment, network traffic information is captured at network information sources (examples of information sources include network devices). These sources provide detailed information about the network communications transactions at a network device. Importantly, different types of sources can provide different types of information. Gatherer devices gather the detailed information from the various information source devices and convert the information into standardized information. The gatherer devices can correlate the gathered information with account information for network transaction accounting. Manager devices manage the gatherer devices and store the gathered standardized information. The manager devices eliminate duplicate network information that may exist in the standardized information. The manager devices also consolidate the information. Importantly, the information stored by the manager devices represents the consolidated, account correlated, network transaction information used for billing. In addition to account information, transaction information can be correlated to other information such as geography information (e.g., the location of an accessed server) and/or transaction routing information (as may be

Signed and Sealed this
Twelfth Day of February, 2013

Teresa Stanek Rea
Acting Director of the United States Patent and Trademark Office

used in peering agreements between Internet Service Providers). The system thereby provides a distributed network accounting and billing system.

In some embodiments, the gatherer devices can access sources through proxy gateways, firewalls, and/or address translation barriers.

In some embodiments, the gatherer devices can correlate the information about a specific transaction with a particular account by accessing the transaction's source and/or destination information. The source and/or destination information is then correlated with account information from an account information database."

with

--A system and method are provided for processing network accounting information. A first network accounting record is received from a first source. Thereafter, the first network accounting record is correlated with accounting information available from a second source. The accounting information with which the first network accounting record is correlated is then used to enhance the first network accounting record.--.

US006836797B2

(12) United States Patent
Givoly et al.

(10) Patent No.: US 6,836,797 B2
(45) Date of Patent: Dec. 28, 2004

(54) **SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR NETWORK RECORD SYNTHESIS**

(75) Inventors: **Tal Givoly**, Cupertino, CA (US); **Limor Schweitzer**, Santa Clara, CA (US)

(73) Assignee: **XACCT Technologies, Ltd.**, Ramat Gan (IL)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 130 days.

(21) Appl. No.: **10/040,297**

(22) Filed: **Oct. 23, 2001**

(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation-in-part of application No. 09/442,876, filed on Nov. 18, 1999, now Pat. No. 6,418,467.

(60) Provisional application No. 60/242,733, filed on Oct. 23, 2000.

(51) **Int. Cl.**[7] **G06F 15/173**

(52) **U.S. Cl.** **709/223**; 709/200; 709/224; 705/30; 713/1; 379/93.25; 379/114; 379/119; 370/401

(58) **Field of Search** 709/200, 223, 709/224, 302, 225; 713/1; 379/93.25, 114, 119, 120, 130, 114.01; 370/401; 705/30

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,218,632 A		6/1993	Cool	....	379/126
5,761,502 A	*	6/1998	Jacobs	....	707/103 R
5,778,350 A	*	7/1998	Adams et al.	....	707/1
5,784,443 A	*	7/1998	Chapman et al.	....	379/119
5,793,853 A	*	8/1998	Sbisa	....	379/120
5,815,556 A	*	9/1998	Thuresson et al.	....	379/93.25
5,852,812 A	*	12/1998	Reeder	....	705/39
5,956,391 A	*	9/1999	Melen et al.	....	379/114.01
6,032,147 A	*	2/2000	Williams et al.	....	707/101
6,047,051 A	*	4/2000	Ginzboorg et al.	....	379/130
6,052,448 A		4/2000	Janning	....	379/114
6,052,797 A		4/2000	Ofek et al.	....	714/6
6,118,936 A	*	9/2000	Lauer et al.	....	709/224
6,157,648 A	*	12/2000	Voit et al.	....	370/401
6,163,602 A	*	12/2000	Hammond et al.	....	379/114.01
6,418,467 B1		7/2002	Schweitzer et al.	....	709/223
6,427,132 B1		7/2002	Bowman-Amuah	....	703/22
6,446,200 B1	*	9/2002	Ball et al.	....	713/1
2001/0034677 A1	*	10/2001	Farhat et al.	....	705/30

* cited by examiner

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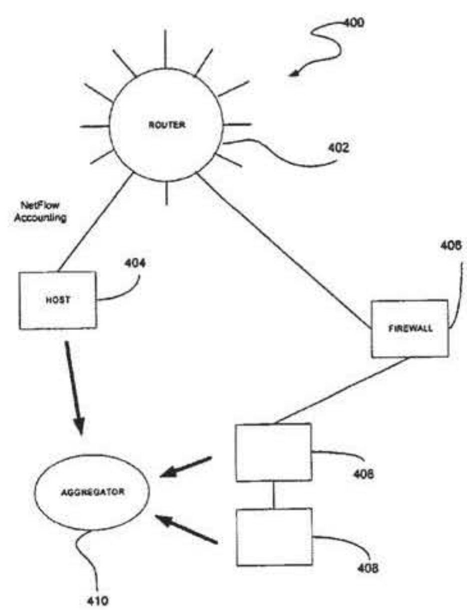
Assistant Examiner—Hai Van Nguyen
(74) *Attorney, Agent, or Firm*—Zilka-Kotab, PC

(57) **ABSTRACT**

A system, method and computer program product are provided for generating a single record reflecting multiple services for accounting purposes. First, a plurality of services carried out over a network are identified. Such services may include an hypertext transfer protocol (HTTP) session, an electronic mail session, and/or a voice over Internet Protocol (IP) session. Further, data is collected describing the plurality of services. A single record is subsequently generated using the collected data to represent each of the services.

19 Claims, 14 Drawing Sheets



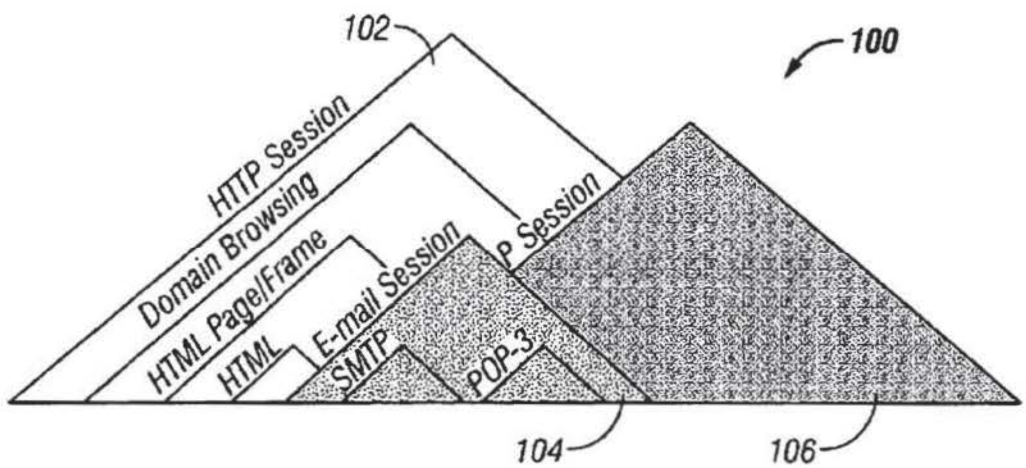

102
100
HTTP Session
Domain Browsing
HTML Page/Frame
HTML
E-mail Session
SMTP
POP-3
P Session
104
106

FIG. 1

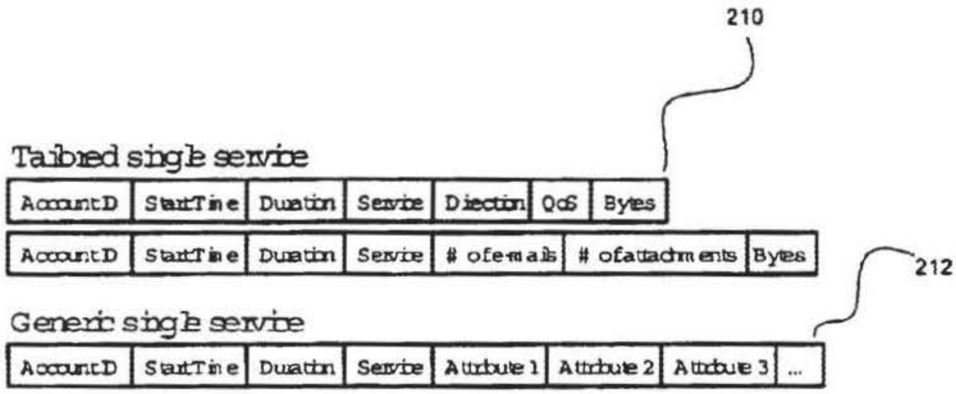

210
Tailored single service
AccountID
StartTime
Duration
Service
Direction
QoS
Bytes
AccountID
StartTime
Duration
Service
# of e-mails
# of attachments
Bytes
212
Generic single service
AccountID
StartTime
Duration
Service
Attribute 1
Attribute 2
Attribute 3
...

Fig. 2

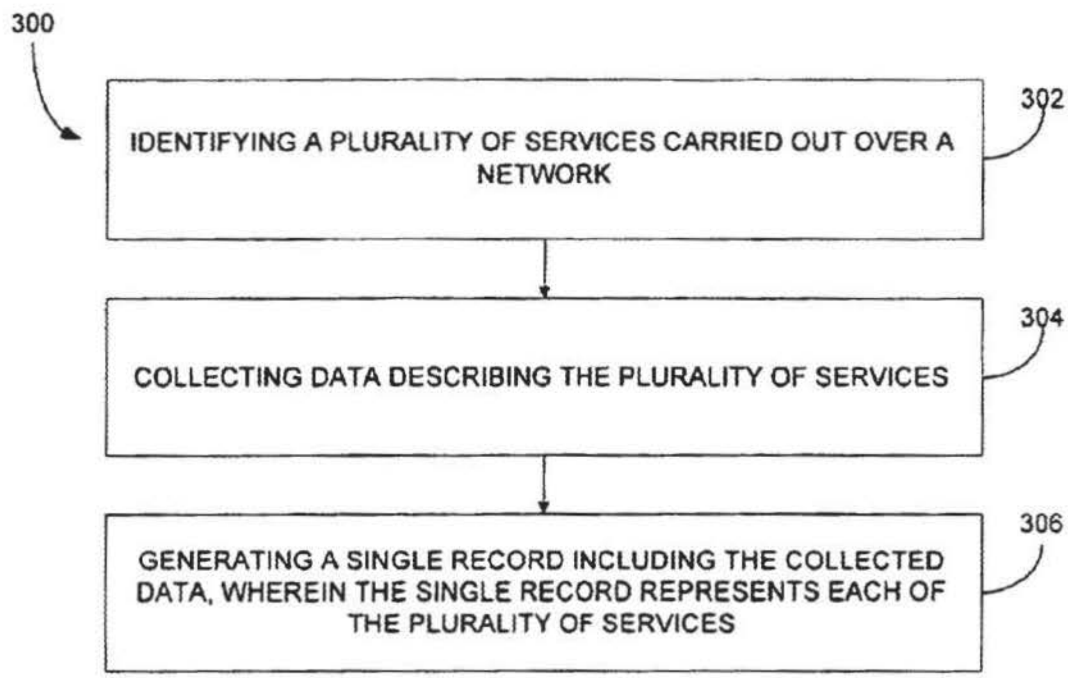

300
IDENTIFYING A PLURALITY OF SERVICES CARRIED OUT OVER A NETWORK
302
COLLECTING DATA DESCRIBING THE PLURALITY OF SERVICES
304
GENERATING A SINGLE RECORD INCLUDING THE COLLECTED DATA, WHEREIN THE SINGLE RECORD REPRESENTS EACH OF THE PLURALITY OF SERVICES
306

Fig. 3

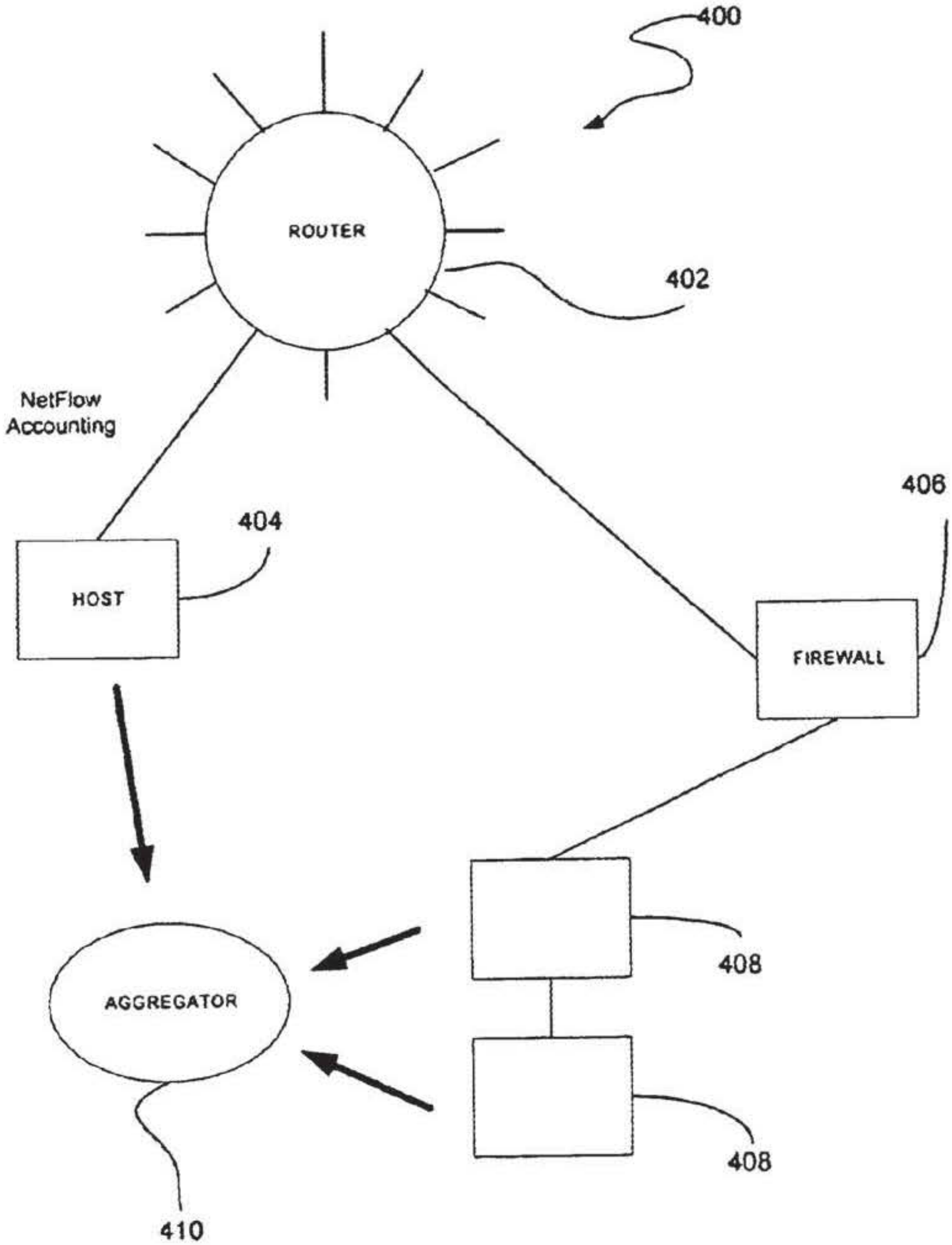
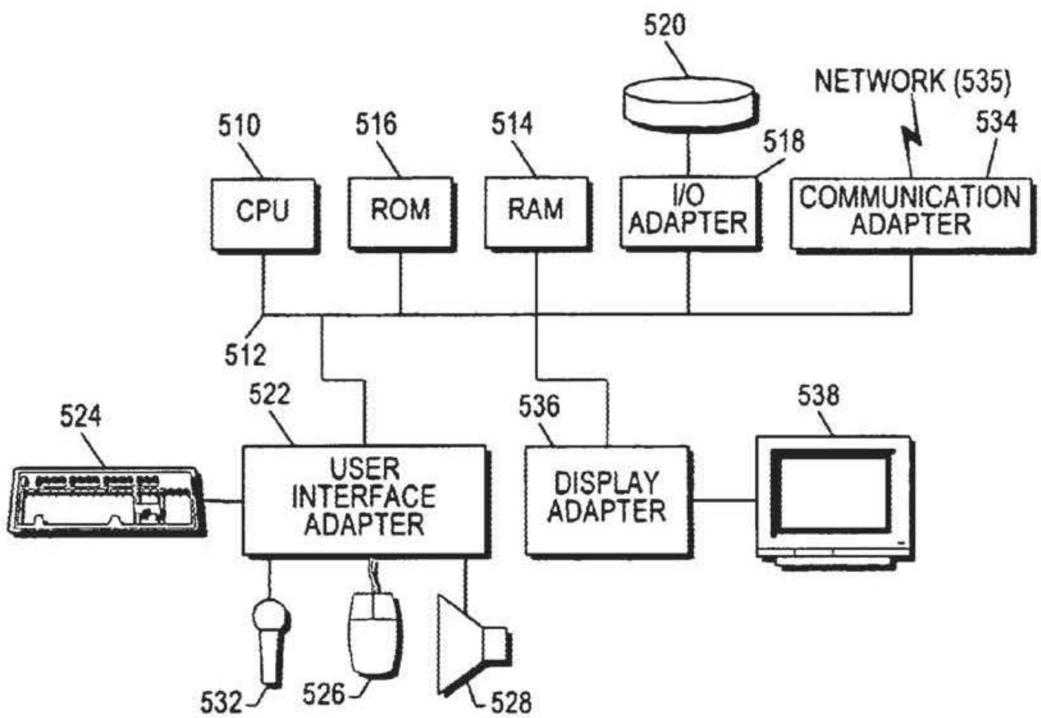

400
ROUTER
402
NetFlow
Accounting
404
HOST
406
FIREWALL
408
AGGREGATOR
408
410

Fig. 4



520
NETWORK (535)
510
516
514
518
534
CPU
ROM
RAM
I/O ADAPTER
COMMUNICATION ADAPTER
512
522
524
536
538
USER INTERFACE ADAPTER
DISPLAY ADAPTER
532
526
528

Fig. 5

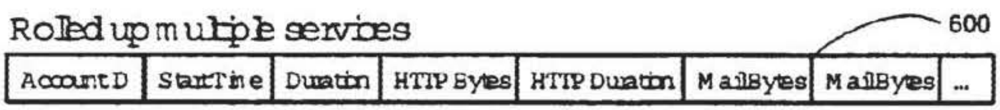
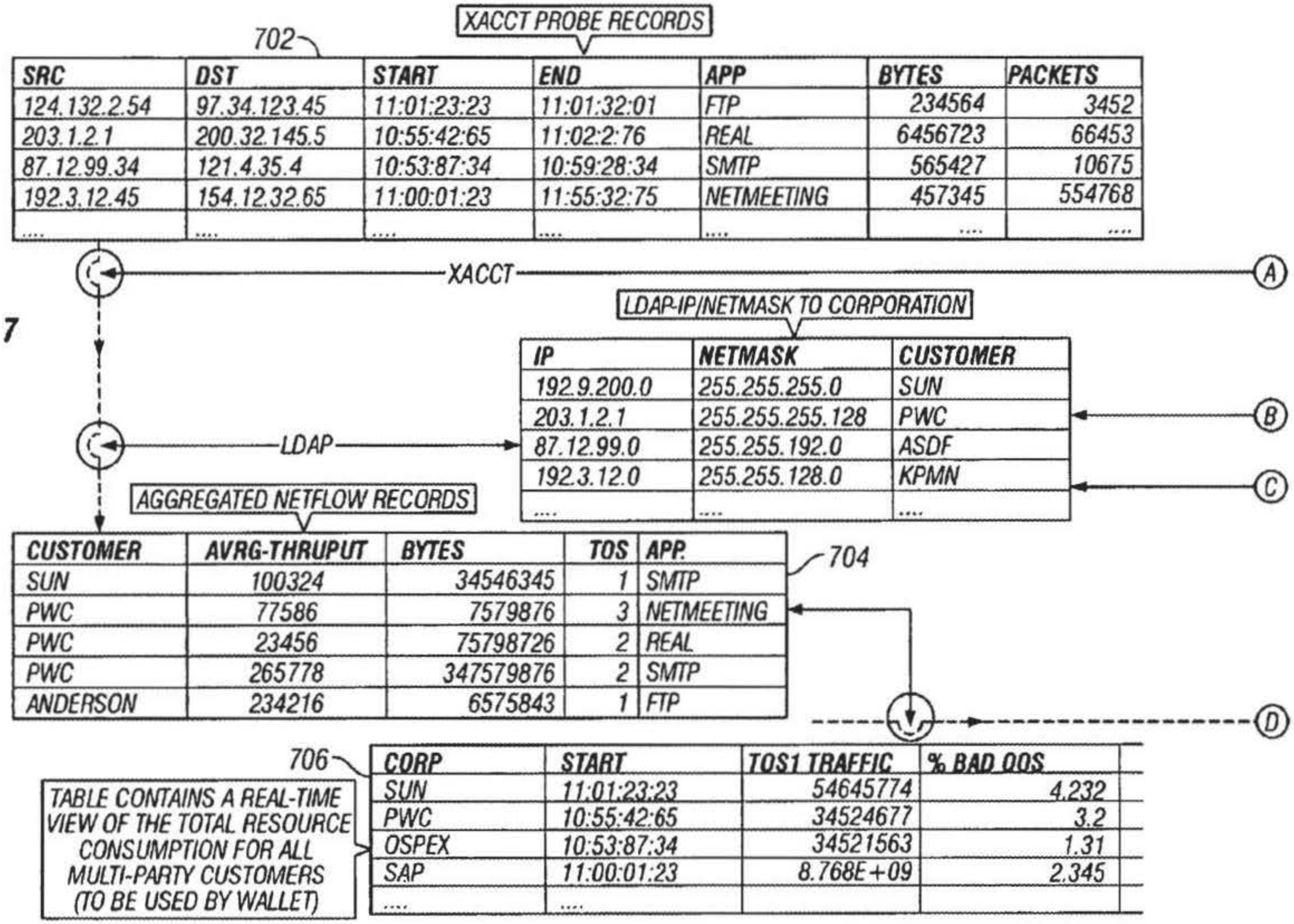

Rolled up multiple services
600
AccountD
StartTime
Duration
HTTP Bytes
HTTP Duration
MailBytes
MailBytes
...

Fig. 6



SRC	DST	START	END	APP	BYTES	PACKETS
124.132.2.54	97.34.123.45	11:01:23:23	11:01:32:01	FTP	234564	3452
203.1.2.1	200.32.145.5	10:55:42:65	11:02:2:76	REAL	6456723	66453
87.12.99.34	121.4.35.4	10:53:87:34	10:59:28:34	SMTP	565427	10675
192.3.12.45	154.12.32.65	11:00:01:23	11:55:32:75	NETMEETING	457345	554768
....	....	....	....	....	....	....

IP	NETMASK	CUSTOMER
192.9.200.0	255.255.255.0	SUN
203.1.2.1	255.255.255.128	PWC
87.12.99.0	255.255.192.0	ASDF
192.3.12.0	255.255.128.0	KPMN
....	....	....

CUSTOMER	AVRG-THRUPUT	BYTES	TOS	APP.
SUN	100324	34546345	1	SMTP
PWC	77586	7579876	3	NETMEETING
PWC	23456	75798726	2	REAL
PWC	265778	347579876	2	SMTP
ANDERSON	234216	6575843	1	FTP

CORP	START	TOS1 TRAFFIC	% BAD QOS
SUN	11:01:23:23	54645774	4.232
PWC	10:55:42:65	34524677	3.2
OSPEX	10:53:87:34	34521563	1.31
SAP	11:00:01:23	8.768E+09	2.345
....	....		

FIG. 7

WEB PROXY RECORDS

SRC	START	BYTES	URL
124.132.2.54	13:01:33:23	23453	http://www.microsoft.com/index.html
203.1.2.1	15:35:47:75	6456723	ftp://ftp.sunsite.unc.edu/pub/gnu/gcc.tgz
87.12.99.34	22:53:23:34	565427	http://www.xxrated.org/welcome.html
192.3.12.45	21:30:21:27	457345	https://www.bankamerica/stocks/ab.gif
....	....	....	....

A E

F

B

C G

AGGREGATED WEB PROXY RECORDS

CUSTOMER	BYTES	PACKETS
SUN	23456346	234235
PWC	9867654	1254245
OSPEX	54654445	213241
SAP	134645676	1242345
....	....	....

706

D H

TOS2 TRAFFIC	% BAD QOS	TOS3 TRAFFIC	% BAD QOS	PROXY PACKETS
7.65E+08	2.342	6.5E+07	4.32	23456346
6.75E+08	2.1	6.8E+09	2.12	9867654
4.57E+08	6.32	6.5E+08	7.322	54654445
6.54E+08	2.13	5.4E+08	2.123	134645676
				....

FIG. 7
(Continued)

VOIP RECORDS

SRC	DST	START	END	BYTES	PACKETS	QoS
124.132.2.54	97.34.123.45	11:01:23:23	11:01:32:01	234564	3452	1
203.1.2.1	200.32.145.5	10:55:42:65	11:02:2:76	6456723	66453	2
87.12.99.34	121.4.35.4	10:53:87:34	10:59:28:34	565427	10675	1
192.3.12.45	154.12.32.65	11:00:01:23	11:55:32:75	457345	54768	2
....	....	....	....	....	....	....

E

F

703

IP	IMIS	CELL	USER ID	CORP
192.9.200.0	1234456634	G233	joe23	SUN
203.1.2.1	3464563432	G234	stevey	SUN
87.12.99.3	5643565434	F45	andrea9	PWC
192.3.12.45	3452346554	F234	juliao	SAP
....	....	....	....	....

GPRS-IP TO IMSI, CELL

DB-IMSI TO USERID, CORP

G

LDAP

AGGREGATED VOIP RECORDS

CUSTOMER	BYTES	PACKETS	TIME
SUN	234145	23414	74:23:14:43
PWC	976556	242135	100:57:56:12
OSPEX	1231244	341251	104:23:56:88
SAP	564453	23513	80:23:65:02
....	....	....	....

H

706

VOIP PACKETS	VOIP TIME	SMTP TRAFFIC	CORP BALANCE
23414	74:23:14:43	76545654	$324,534.20
242135	100:57:56:12	32245466	$434,521.50
341251	104:23:56:88	321234542	$321,234.42
23513	80:23:65:02	76543565	$7,643.55
....	....		

700

FIG. 7
(Continued)

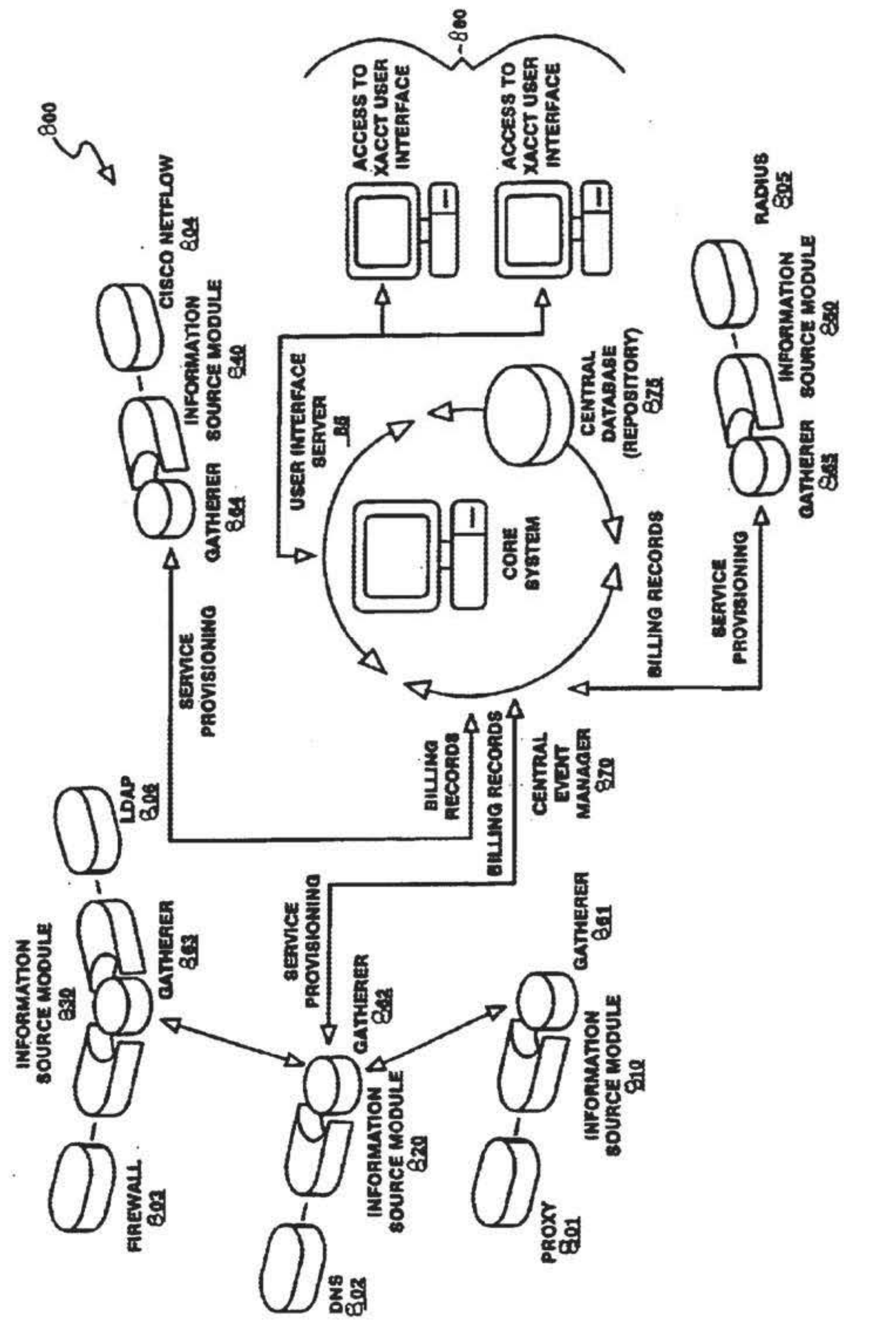

800
880
ACCESS TO XACCT USER INTERFACE
ACCESS TO XACCT USER INTERFACE
CISCO NETFLOW 804
INFORMATION SOURCE MODULE 840
GATHERER 864
USER INTERFACE SERVER 85
CORE SYSTEM
CENTRAL DATABASE (REPOSITORY) 875
BILLING RECORDS
SERVICE PROVISIONING
RADIUS 805
INFORMATION SOURCE MODULE 850
GATHERER 865
SERVICE PROVISIONING
BILLING RECORDS
BILLING RECORDS
CENTRAL EVENT MANAGER 870
LDAP 806
INFORMATION SOURCE MODULE 830
GATHERER 863
SERVICE PROVISIONING
GATHERER 862
GATHERER 861
INFORMATION SOURCE MODULE 820
INFORMATION SOURCE MODULE 810
FIREWALL 803
DNS 802
PROXY 801

FIG. 8

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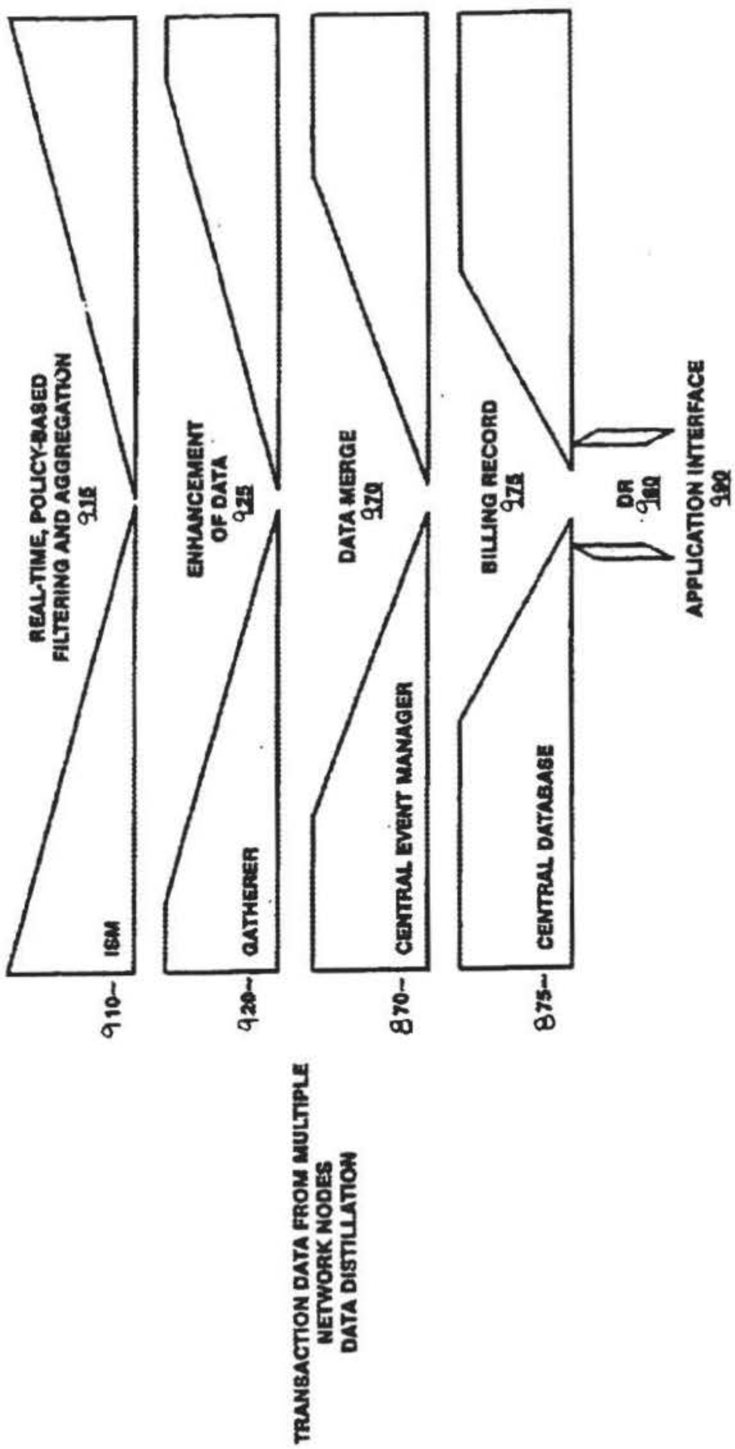

FIG. 9

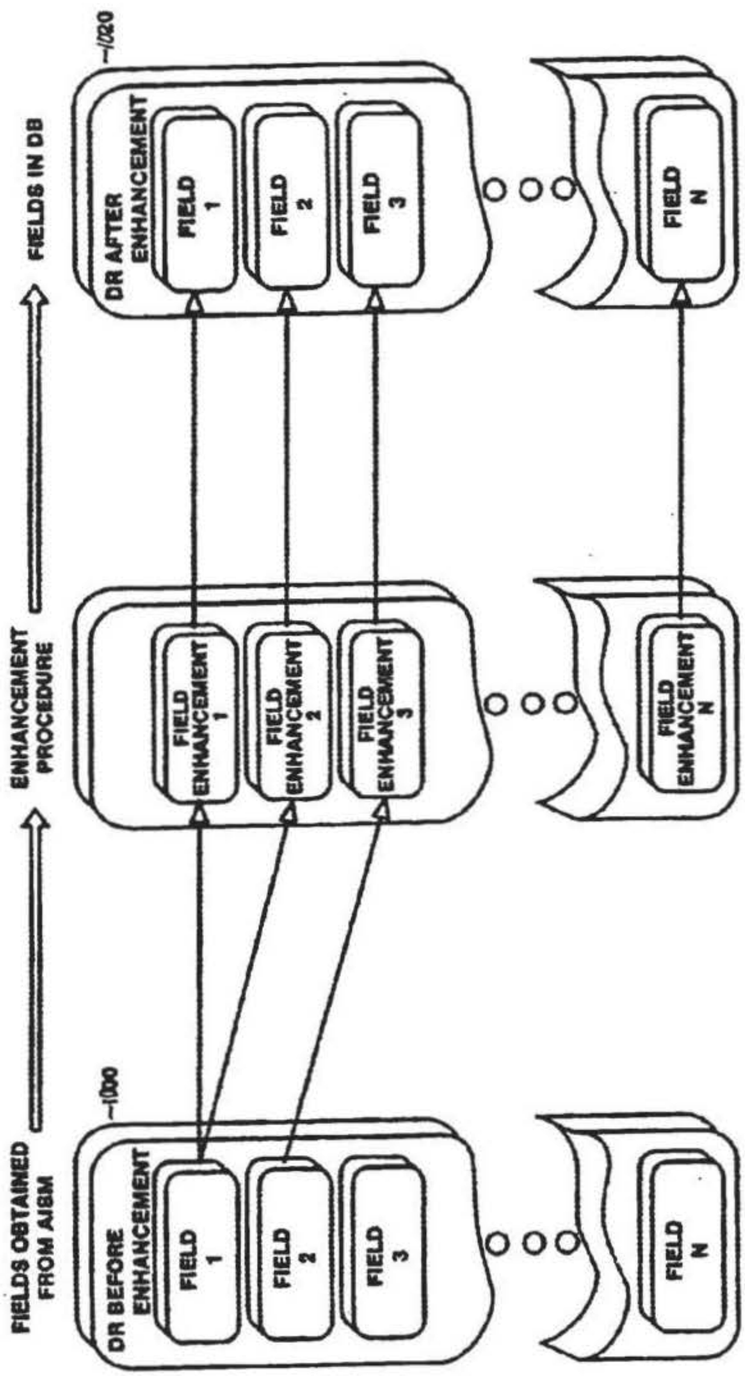
FIELDS OBTAINED FROM AISM
ENHANCEMENT PROCEDURE
FIELDS IN DB
1000
DR BEFORE ENHANCEMENT
FIELD 1
FIELD 2
FIELD 3
FIELD N
FIELD ENHANCEMENT 1
FIELD ENHANCEMENT 2
FIELD ENHANCEMENT 3
FIELD ENHANCEMENT N
1020
DR AFTER ENHANCEMENT
FIELD 1
FIELD 2
FIELD 3
FIELD N

FIG. 10

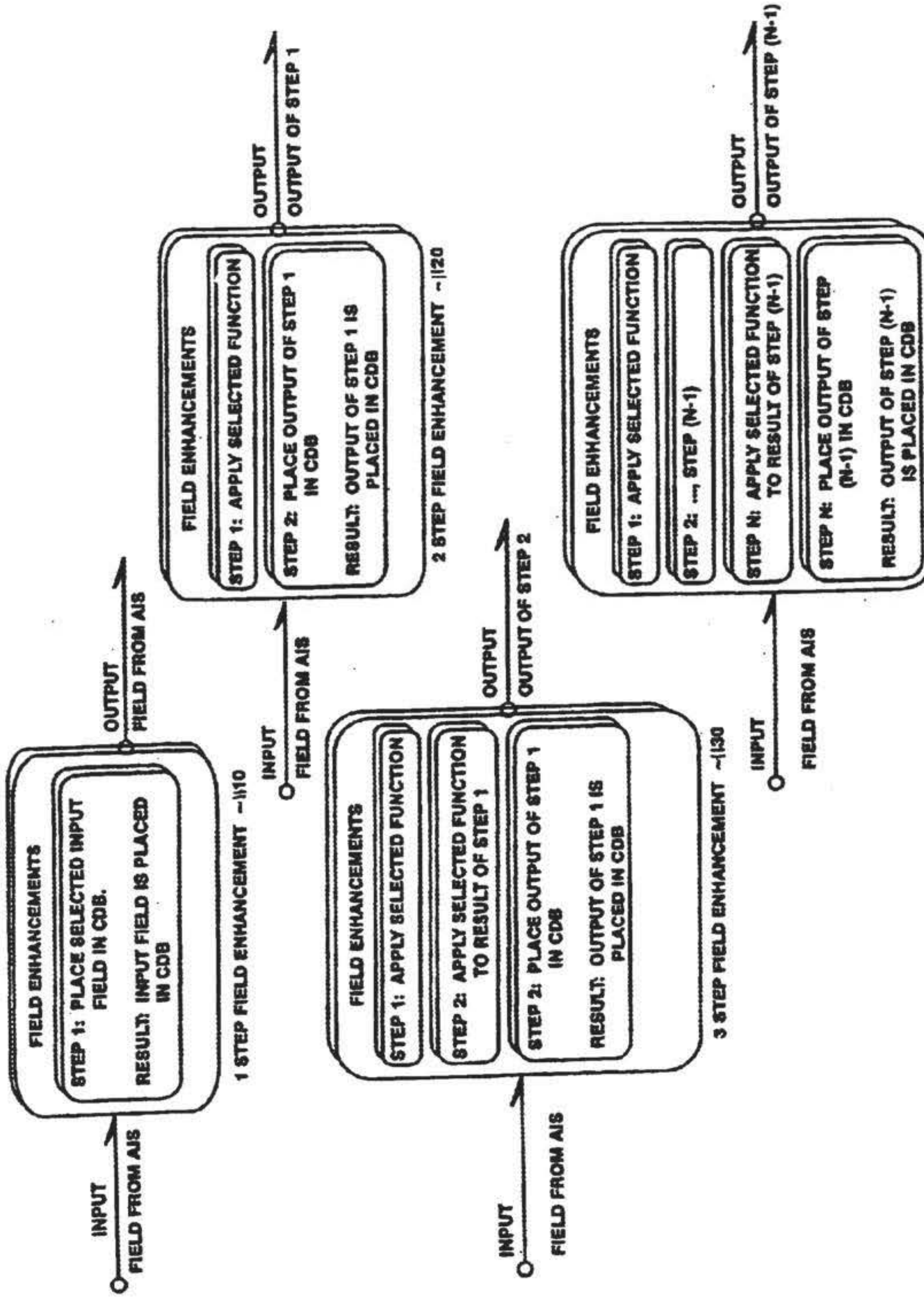
INPUT
FIELD FROM AIS
FIELD ENHANCEMENTS
STEP 1: PLACE SELECTED INPUT FIELD IN CDB.
RESULT: INPUT FIELD IS PLACED IN CDB
OUTPUT
FIELD FROM AIS
1 STEP FIELD ENHANCEMENT ~110
INPUT
FIELD FROM AIS
FIELD ENHANCEMENTS
STEP 1: APPLY SELECTED FUNCTION
STEP 2: PLACE OUTPUT OF STEP 1 IN CDB
RESULT: OUTPUT OF STEP 1 IS PLACED IN CDB
OUTPUT
OUTPUT OF STEP 1
2 STEP FIELD ENHANCEMENT ~120
INPUT
FIELD FROM AIS
FIELD ENHANCEMENTS
STEP 1: APPLY SELECTED FUNCTION
STEP 2: APPLY SELECTED FUNCTION TO RESULT OF STEP 1
STEP 2: PLACE OUTPUT OF STEP 1 IN CDB
RESULT: OUTPUT OF STEP 1 IS PLACED IN CDB
OUTPUT
OUTPUT OF STEP 2
3 STEP FIELD ENHANCEMENT ~130
INPUT
FIELD FROM AIS
FIELD ENHANCEMENTS
STEP 1: APPLY SELECTED FUNCTION
STEP 2: ..., STEP (N-1)
STEP N: APPLY SELECTED FUNCTION TO RESULT OF STEP (N-1)
STEP N: PLACE OUTPUT OF STEP (N-1) IN CDB
RESULT: OUTPUT OF STEP (N-1) IS PLACED IN CDB
OUTPUT
OUTPUT OF STEP (N-1)
N STEP FIELD ENHANCEMENT ~140

FIG. 11A

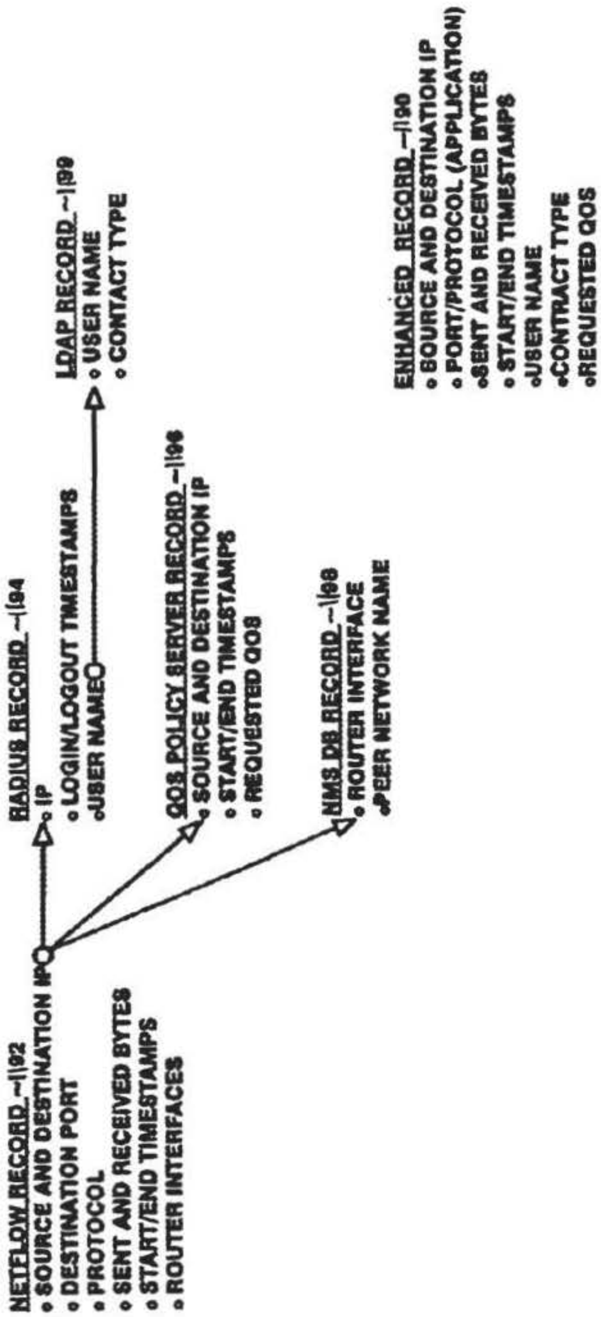
NETFLOW RECORD ~192
SOURCE AND DESTINATION IP
DESTINATION PORT
PROTOCOL
SENT AND RECEIVED BYTES
START/END TIMESTAMPS
ROUTER INTERFACES
RADIUS RECORD ~194
IP
LOGIN/LOGOUT TIMESTAMPS
USER NAME
QOS POLICY SERVER RECORD ~196
SOURCE AND DESTINATION IP
START/END TIMESTAMPS
REQUESTED QOS
NMS DB RECORD ~198
ROUTER INTERFACE
PEER NETWORK NAME
LDAP RECORD ~199
USER NAME
CONTACT TYPE
ENHANCED RECORD ~190
SOURCE AND DESTINATION IP
PORT/PROTOCOL (APPLICATION)
SENT AND RECEIVED BYTES
START/END TIMESTAMPS
USER NAME
CONTRACT TYPE
REQUESTED QOS

FIG. 11B

SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR NETWORK RECORD SYNTHESIS

RELATED APPLICATION(S)

The present application is a continuation-in-part of an application filed Nov. 18, 1999 under Ser. No. 09/442,876 now U.S. Pat. No. 6,418,467, which is incorporated herein by reference in its entirety. The present application also claims priority from a provisional application filed Oct. 23, 2000 under Ser. No. 60/242,733, which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

The present invention relates to data records, and more particularly to records reflecting various services afforded utilizing a network.

BACKGROUND OF THE INVENTION

Network accounting involves the collection of various types of records while sending and receiving information over a network. Examples of such records may include, but are not limited to a session's source, destination, user name, duration, time, date, type of server, volume of data transferred, etc. Armed with such accounting records, various services may be provided that require network usage metering of some sort.

Prior art FIG. **1** is a diagram illustrating the various services **100** offered over a network such as the Internet. As shown, the various services include a hypertext transfer protocol (HTTP) session **102**, an electronic mail session **104**, and a voice over Internet Protocol (IP) session **106**. The HTTP session **102** may include domain browsing, accessing an HTML page/frame, etc. The electronic mail session **104** may involve an SMTP transmitting server address and a POP3 receiving server address.

As shown, various levels of detailed information may be collected regarding numerous services afforded utilizing the Internet. Such information may be gathered with varied granularity depending on the accounting purpose at hand. For example, billing is currently handled based on a dial-up session which may include all of the above sessions. There may be situations where it is desired that billing be carried out as a function of domain browsing, an email session, etc. Such types of accounting are becoming increasingly important since permanent connections, i.e. DSL, Cable, GPRS, LAN, etc., are more and more prevalent, thus rendering billing based on a dial-up session obsolete.

With such opportunities to use such diversified records of Internet usage, a problem arises in collecting the same in an organized manner. Prior Art FIG. **2** illustrates prior art methods of organizing accounting information. As shown, a tailored single service data block **210** may be customized to account for specific services. For example, account, start time, duration, service, direction, quality-of-service (QoS), byte amount, number of e-mail, number of attachments identifiers or the like may be specifically accounted for in pre-allocated portions of the data block **210**.

In yet another example, a generic single service data block **212** may be used to account for common information, i.e. an account identifier, start time, duration, service identifier, etc. Further, certain portions of the data block **212** may be allocated for attributes that may vary from service to service.

While these methods of accounting for network usage are somewhat effective, they fail to allow versatility to be introduced into the tracking process. In particular, as the amount of available tracking data increases, so does the complexity in handling such accounting information. An example of such complexity is exhibited when trying to organize services provided to a single customer.

There is therefore a need for a technique of rolling up service accounting information in a way which permits improved versatility and performance.

BRIEF DESCRIPTION OF THE DRAWINGS

Prior art FIG. **1** is a diagram illustrating the various services offered over a network such as the Internet;

Prior Art FIG. **2** illustrates prior art methods of organizing accounting information;

FIG. **3** illustrates a method for generating a single record reflecting multiple services for accounting purposes;

FIG. **4** illustrates an exemplary network framework on which one embodiment of the present invention may be implemented;

FIG. **5** shows a representative hardware environment associated with the various devices, i.e. host, etc. shown in the network diagram of FIG. **4**;

FIG. **6** illustrates an exemplary data block;

FIG. **7** illustrates a flow diagram of a method for further rolling up the services in a single data block; and

FIGS. **8–11**B illustrate an alternate exemplary architecture with which the foregoing techniques may be implemented.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. **1–2** illustrate the prior art. FIG. **3** illustrates a method **300** for generating a single record reflecting multiple services for accounting purposes. First, in operation **302**, a plurality of services carried out over a network, i.e. the Internet, are identified. Such services may include a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, and/or a voice over Internet Protocol (IP) session.

Thereafter, data is collected describing each of the plurality of services in operation **304**. Examples of such data may include, but are not limited to a session's source, destination, user name, duration, time, date, type of server, QoS information, volume of data transferred, etc. A single record is subsequently generated including the collected data. Such single record represents each of the services. Note operation **306**. As an option, the single record may include data in various prior art data block formats discussed hereinabove in the background section. Thus, the single record may include a combination of different data block formats.

FIG. **4** illustrates an exemplary network framework **400** on which one embodiment of the present invention may be implemented. It should be noted that the network framework **400** of FIG. **4** need not necessarily be used, and any type of network framework may be utilized per the desires of the user. As shown in FIG. **4**, various network components may be provided including a router **402** for routing information between various portions of the network. In one embodiment, such network may include the Internet using a communication protocol such as TCP/IP or IPX. It should be noted, however, that the network may include any type of network including, but not limited to a wide area network (WAN), Metropolitan Area Network (MAN), local area network (LAN), etc.

Further provided is a host **404** coupled to the router **402** for sending information thereto and receiving information therefrom. A firewall **406** may also be coupled to router **402** for controlling access to a network or a plurality of interconnected devices **408**. While various network components have been disclosed, it should be understood that the present invention may be implemented in the context of any type of network architecture and in any type of network device such as proxy servers, mail servers, hubs, directory servers, application servers, AAA (Authentication, Authorization, Accounting) servers, etc.

Coupled to the various network devices is an aggregator **410**. In use, the aggregator **410** receives records from the devices for the purpose of aggregating the same. In the present description, aggregation refers to consolidation, analysis, or any other type of handling of data. Once aggregated, the records may be used to afford any desired type of service, OSS (Operational Support System), and/or BSS (Business Support System), i.e. billing, fraud detection, network monitoring, traffic engineering, etc. By this structure, the services may be identified, and data collected in accordance with operations **302** and **304**.

FIG. **5** shows a representative hardware environment associated with the various devices, i.e. host, etc. shown in the network diagram of FIG. **4**. Such figure illustrates a typical hardware configuration of a workstation in accordance with a preferred embodiment having one or multiple central processing units **510**, such as a microprocessor, and a number of other units interconnected via a system bus **512**. The workstation shown in FIG. **5** includes a Random Access Memory (RAM) **514**, Read Only Memory (ROM) **516**, an I/O adapter **518** for connecting peripheral devices such as disk storage units **520** to the bus **512**, a user interface adapter **522** for connecting a keyboard **524**, a mouse **526**, a speaker **528**, a microphone **532**, and/or other user interface devices such as a touch screen (not shown) to the bus **512**, communication adapter **534** for connecting the workstation to a communication network **535** (e.g., a data processing network) and a display adapter **536** for connecting the bus **512** to a display device **538**.

The workstation may have resident thereon an operating system such as the Microsoft Windows NT or Windows Operating System (OS), the IBM OS/2 operating system, the MAC OS, or UNIX operating system. It will be appreciated that a preferred embodiment may also be implemented on platforms and operating systems other than those mentioned. A preferred embodiment may be written using JAVA, C, and/or C++ language, or other programming languages, along with an object oriented programming methodology. Object oriented programming (OOP) has become increasingly used to develop complex applications.

For further information on another exemplary architecture embodiment, reference may be made to PCT application WO9927556A2 entitled "NETWORK ACCOUNTING AND BILLING SYSTEM AND METHOD" published Jun. 3, 1999, which is incorporated herein by reference in its entirety. More information on such exemplary system will be set forth hereinafter starting with reference to FIG. **8**.

It should be noted that the foregoing architectures should not be construed as limiting in any manner, and should be taken to merely represent exemplary systems for illustrative purposes only. For example, the present embodiment may be implemented in the context of any chip, host, router, network device, architecture, etc. that is desired.

FIG. **6** illustrates an exemplary data block **600** generated in accordance with operation **306**. As shown, the data block

600 may include data collected during a plurality of distinct services, i.e. HTTP session, an electronic mail session, and/or a voice over IP session. The data may be directly collected from network devices or obtained from aggregators as illustrated in FIG. **4**. For example, the data block **600** may include an account identifier, a start time of a session, a duration of the session, a number of HTTP bytes downloaded during the session, mail bytes, etc.

FIG. **7** illustrates a flow diagram of a method **700** for further rolling up the services into a single data block. Such single data block may be sent to a Business Support System (BSS)for the purposes of billing at least one recipient of the services, or engaging in other accounting services.

As shown in FIG. **7**, a plurality of the records **702** may be collected and grouped, where each group of records relates to the usage of a specific type of service, e.g. web surfing, e-mail, voice over IP calls, and multimedia streaming, etc. The records **702** may reflect the usage of any granularity required for billing of a BSS. Thereafter, tables **703** may be employed to identify customers who received the services identified in the records **702**. This may be accomplished by correlating an IP address with user identifiers, users' location information, company identifiers, or any other desired method.

Thereafter, separate records **704** may be generated based upon correlating a plurality of records **702** and information contained in tables **703**. How the correlation is performed may depend on the billing requirements of a BSS. Such separate records **704** may include a company identifier and usage data associated with one particular service. As such, the separate record **704** may represent each of the plurality of records **702**.

Still yet, a rolled up record **706** may include data of all of the services associated with each of the particular companies. Accordingly, this technique may be used to roll up a plurality of records associated with a plurality of customers, and services provided to those customers. The structure of such a record **706** is totally flexible and may include any type of customer/company identifier, and associated usage information of a service.

In one specific example of use, the IP usage information of individual mobile users (typically associated with an IP address) may be collected and stored in probe records **702**, web proxy records **704**, and voIP records **706**. By correlating and aggregating the IP usage information with user information stored in an LDAP, GPRS (General Packet Radio Service), and database, aggregated IP usage information may be obtained that are stored in aggregated netflow records, aggregated web proxy records, and aggregated voIP records. Based on the aggregated usage information, a table may be constructed in the manner shown to present a real-time view of the total resource consumption for all multi-party customers. In the context of the present description, a "real-time" environment is that which ensures no more than a fixed latency.

The present invention offers great flexibility to support billing requirements for various business models. It may even be the key enabler to support advanced billing schemes, such as a marketing tariff/rate scheme. A single consolidated record that rolls up information related to services, e-business transactions, content accesses, and information inquiries, etc. can be provided to a BSS for billing. By this design, schemes may be supported where, for example, a customer gets free Internet access while he or she is buying books from an affiliated e-store. The present invention thus allows usage data to be processed close to a

collection point by organizing it in a unique manner, namely a single record.

Alternate Exemplary Embodiment

One embodiment of a system in which the foregoing details may be implemented will now be set forth. Of course, the following description should not be construed as limiting in any manner, and should be taken to represent merely an exemplary system for illustrative purposes.

The present embodiment includes a multi-source, multi-layer network usage metering and mediation solution that gives Network Service Providers (NSPs), including Internet Service Providers (ISPs) and enterprise network (Intranet) operators, the information needed to set the right-price for IP(Internet Protocol) services. With the system, the providers can generate accurate usage-based billing and implement usage-based charge-back models. The system derives IP session and transaction information, collected in real time, from a multitude of network elements. The system gathers, correlates, and transforms data from routers, switches, firewalls, authentication servers, LDAP, Web hosts, DNS, and other devices to create comprehensive usage and billing records.

The system transforms raw transaction data from network devices into useful billing records though policy-based filtering, aggregation, and merging. The result is a set of detail records (DRs). In some embodiments, the detail records are XaCCT Detail Records (XDRs™) available from XaCCT Technologies. DRs are somewhat similar in concept to the telephony industry's Call Detail Records (CDRs). Thus, DRs can be easily integrated with existing Customer Care and Billing (CCB) systems.

In addition to billing data, DRs enable NSPs to deploy new services based on documented usage trends, plan network resource provisioning, and audit service usage. The system provides a clear picture of user-level network service use by tracking a variety of metrics such as actual session Quality of Service (QoS), traffic routes, and end-user application transactions.

The system is based on a modular, distributed, highly scalable architecture capable of running on multiple platforms. Data collection and management is designed for efficiency to minimize impact on the network and system resources.

The system minimizes network impact by collecting and processing data close to its source. Modular architecture provides maximum configuration flexibility, and compatibility with multiple network information sources.

The system, or other embodiments, may have one or more of the following features.

Data collection can be from a wide range of network devices and services, spanning all layers of the network—from the physical layer to the application layer.

Real-time, policy-based filtering, aggregation, enhancement and merging create accurate, detailed and comprehensive session detail records(DRs).

Real time correlation of data from various sources allows billing record enhancement.

Leverages existing investment through integration with any customer care & billing solution, reducing costs, minimizing risks and shortened time-to-market.

Non-intrusive operation eliminates any disruption of network elements or services.

Web-based user interface allows off-the-shelf browsers to access the system, on-demand, locally or remotely.

Carrier-class scalability allows expansion to fit an NSPs needs without costly reconfiguration.

Distributed filtering and aggregation eliminates system capacity bottlenecks.

Efficient, centralized system administration allows on-the-fly system reconfigurations and field upgrades.

Customized reporting with built-in report generation or an NSPs choice of off-the-shelf graphical reporting packages.

Comprehensive network security features allow secure communication between system components and multiple levels of restricted access.

System Details

The following describes the system **800** of FIG. **8**. The system **800** allows NSPs to account for and bill for IP network communications. The following paragraphs first list the elements of FIG. **8**, then describes those elements and then describes how the elements work together. Importantly, the distributed data gathering, filtering and enhancements performed in the system **800** enables load distribution. Granular data can reside in the peripheries of the system **800**, close to the information sources. This helps avoids reduce congestion in network bottlenecks but still allows the data to be accessible from a central location. In previous systems, all the network information flows to one location, making it very difficult to keep up with the massive record flows from the network devices and requiring huge databases.

The following lists the elements of FIG. **8**. FIG. **8** includes a number of information source modules (ISMs) including an ISM **810**, an ISM **820**, an ISM **830**, an ISM **836**, an ISM **840**, and an ISM **850**. The system also includes a number of network devices, such as a proxy server **801**, a DNS **802**, a firewall **803**, an LDAP **806**, a CISCO NetFlow **804**, and a RADIUS **805**. The system also includes a number of gatherers, such as a gatherer **867**, a gatherer **862**, a gatherer **863**, a gatherer **864**, and a gatherer **865**. The system of FIG. **8** also includes a central event manager (CEM) **870** and a central database (repository) **875**. The system also includes a user interface server **885** and a number terminals or clients **880**.

This paragraph describes how the elements of FIG. **8** are coupled. The various network devices represent devices coupled to an IP network such as the Internet. The network devices perform various functions, such as the proxy server providing proxy service for a number of clients. Each network device is coupled to a corresponding ISM. For example, the proxy server **801** is coupled to the ISM **810**. The DNS **802** is coupled to the ISM **820**. The firewall **803** is coupled to the ISM **830**. The ISM **836** is coupled to the LDAP **806**. The ISM **840** is coupled to the CISCO NetFlow **804**. The ISM **850** is coupled to the RADIUS **805**. Each gatherer is associated with at least one ISM. Thus, the gatherer **861** is associated with the ISM **810** and is therefore coupled to that ISM. The gatherer **862** is coupled to the ISM **820**. The gatherer **863** is coupled to the ISM **830** and the ISM **836**. The gatherer **864** is coupled to the ISM **840**. The gatherer **865** is coupled to the ISM **850**. The various gatherers are coupled to the CEM **870**. The user interface server is coupled to the terminals **880** and the CEM **870**.

The following paragraphs describe each of the various elements of FIG. **8**.

Network Devices

The network devices represent any devices that could be included in a network. (Throughout the description, a network device, unless specifically noted otherwise, also refers to an application server.) A network device represents a subset of information sources that can be used by the system

800. That is, the network devices are merely representative of the types of sources of information that could be accessed. Other devices such as on-line transaction processing databases can be accessed in other embodiments of the invention. Typically, the network devices keep logging and statistical information about their activity. A network information source can be the log file of a mail server, the logging facility of a firewall, a traffics statistics table available on a router and accessible through SNMP, a database entry accessible through the Internet, an authentication server's query interface, etc. The network devices represent the information sources accessed by the ISMs.

Each type of network device can be accessing using a different method or protocols. Some generate logs while others are accessible via SNMP, others have proprietary APIs or use other protocols.

ISMs

The ISMs act as an interface between the gatherers and the network devices enabling the gatherers to collect data from the network devices. Thus, the ISMs represent modular, abstract interfaces that are designed to be platform-neutral. The information source modules act as interfaces or "translators", sending IP usage data, in real time, from the network devices to the gatherers. Each ISM is designed for a specific type of network data source. (In other embodiments, some ISMs are generic in that they can extract information from multiple network devices). ISMs can be packaged separately, allowing NSPs to customize ISM configurations to meet the specific requirements of their network. For example, in the system of FIG. **8**, if the NSP did not have Cisco NetFlow devices, then the ISM **840** would not have to be included.

The ISMs can communicate with its corresponding network device using protocols and formats such as UDP/IP, TCP/IP, SNMP, telnet, file access, ODBC, native API, and others.

In some embodiments, the reliability of system **800** is enhanced through on-the-fly dynamic reconfiguration, allowing the NSP to add or remove modules without disrupting ongoing operations. In these embodiments, the CEM **870** can automatically update the ISMs.

The following ISMs are available in some embodiments of the invention.

- Categorizer—Classifies a session to a category according to user-defined Boolean expression.
- DNS (e.g. ISM **820**)—Resolves host names and IP addresses.
- Generic Proxy Server (e.g., ISM **810**)—Collects data from access logs in a common log format.
- Port/Protocol Resolution—Converts protocol/port information to account names and vice versa.
- CheckPoint FireWall-1—Collects data from FireWall-1 accounting log and security log.
- Cisco IOS IP Accounting—Collects accounting data from a Cisco router using IOS IP accounting.
- Cisco NetFlow Switching—Collects session data from a Cisco router via NetFlow switching.
- NETRANET—Collects information from a standard network device.
- Netscape Proxy Server—Collects data from a Netscape Proxy Server.
- Microsoft Proxy Server—Collects data from a Microsoft ProxyServer.

ISMs can be synchronous, asynchronous or pipe. The data from an asynchronous ISM is dynamic so that the asynchronous ISM reacts to the information and relays it to the associated gatherer without prompting from other information sources in the system **800**. If the firewall **803** were a CheckPoint FireWall-1, then the ISM **830** would be an example of an asynchronous ISM. When a network session is initiated, the details are recorded by the FireWall-1 **803**. The corresponding ISM **830** receives the details and passes them on automatically to the gatherer **863**.

Synchronous ISMs provide its information only when accessed by a gatherer. The ISM **820** is an example of a synchronous ISM. The DNS server **802** maintains information matching the IP addresses of host computers to their domain addresses. The ISM **820** accesses the DNS server **802** only when the ISM **820** receives a request from the gather **862**. When the DNS server **802** returns a reply, the ISM **820** relays the reply information to the gatherer **862**.

Pipe ISMs operate on record flows (batches of records received from information sources). Pipe ISMs process one or more enhancement flows the records as the flows arrive. The pipe ISM may initiate new record flows or may do other things such as generate alerts or provision network elements to provide or stop services. The pipe is implemented as an ISM to keep the internal coherency and logic of the architecture. (Record flows can terminate in a database or in a pipe ISM. The pipe ISM can perform filtering and aggregation, send alarms, or act as a mediation system to provision network elements when some event occurs or some accumulated value is surpassed. Specifically, pipe ISMs can act to enable prepayment systems to disable certain services such as a voice IP call, when the time limit is surpassed or amount of data is reached.)

The gatherers can include caches and buffers for storing information from the ISMs. The buffers allow the gatherers to compensate for situations where there is a loss of connection with the rest of the system **800**. The cache sizes can be remotely configured. The cache minimizes the number of accesses to the Information Source.

ISM queries can be cached and parallelized. Caching of synchronous ISM queries provides for fast responses. Parallelizing queries allows for multiple queries to be processed at the same time.

Gatherers

The gatherers gather the information from the ISMs. In some embodiments, the gatherers are multi-threaded, lightweight, smart agents that run on non-dedicated hosts, as a normal user application on Windows NT or Unix, as a background process, or daemon. What is important though is that the gatherers can be any hardware and/or software that perform the functions of a gatherer.

The gatherers can be installed on the same network segment as the network device such as router and switch or on the application server itself. This placement of a gatherer minimizes the data traffic impact on the network.

The gatherers collect network session data from one or more ISMs. Session data can be sent to another gatherer for enhancement or to the CEM **870** for merging and storing in the central database **870**. The gatherers can be deployed on an as needed basis for optimal scalability and flexibility.

The gatherers perform flexible, policy-based data aggregation. Importantly, the various types of ISMs provide different data and in different formats. The gatherers normalize the data by extracting the fields needed by the CEM **870** and filling in any fields that may be missing. Thus, the gatherers act as a distributed filtering and aggregation system. The distributed data filtering and aggregation eliminates capacity bottlenecks improving the scalability and efficiency of the system **800** by reducing the volume of data sent on the network to the CEM **870**.

Aggregation can be done by accumulating groups of data record flows, generating a single data record for each group. That single record then includes the aggregated information. This reduces the flow of the data records.

Filtering means discarding any record that belongs to a group of unneeded data records. Data records are unneeded if they are known to be collected elsewhere. A policy framework enables the NSP to configure what to collect where.

Filtering and/or aggregation can be done at any point along a data enhancement (described below) so that aggregation schemes can be based on enhanced data records as they are accumulated. The filtering and/or aggregation points are treated by the system **800** as pipe ISMs which are flow termination and flow starting points (i.e.: like an asynchronous ISM on the starting end and like a database on the terminating end). Data enhancement paths and filtering and/or aggregation schemes can be based on accumulated parameters such as user identification information and a user's contract type.

As noted above, the PISM can be used in the context of filtering and/or aggregation. One or more record flows can terminate at the PISM and can be converted into one or more new record flows. Record flows are grouped based on matching rules that apply to some of the fields in the record flows, while others are accumulated or undergo some other operation such as "maximum" "average". Once the groups of accumulated records have reached some threshold, new accumulated records are output. This can be used for example in order to achieve a business-hybrid filtering and aggregation data reduction by imposing the business rules or the usage-based products that are offered to the customer, onto the record flows as they are collected in real-time. This is done instead of previous system where the information is stored in a database and then database operations are performed in order to create bills or reports. The filtering and aggregation reduces the amount of data that is stored in the central database **875** while not jeopardizing the granularity of data that is necessary in order to create creative usage-based products.

Typically, data collected from a single source does not contain all the information needed for billing and accounting, such as user name and organization. In such cases, the data is enhanced. By combining IP session data from multiple sources, such as authentication servers, DHCP and Domain Name servers, the gatherers create meaningful session records tailored to the NSP's specific requirements. In the example of FIG. **8**, the gatherer **861** can provide information to the gatherer **862** so that the source IP address for an Internet session from the proxy server **801** can be combined with the domain address from the DNS server **802**.

The enhancement procedure can be triggered by an asynchronous ISM. The information from the asynchronous ISM is associated with field enhancements in the central database **875**. A field enhancement defines how a field in the central database is filled from the source data obtained from the asynchronous ISM. Through the field enhancements, the missing parameters are added to a record using the data collected from one or more synchronous ISMs. Enhancements are described in detail below.

The gatherers can include caches and buffers for storing information from the ISMs. The buffers allow the gatherers to compensate for situations where there is a loss of connection with the rest of the system **800**. The caches can reduce the number of accesses to an information source. The buffer and/or cache sizes can be remotely configured.

Central Event Manager (CEM)

The Central Event Manager (CEM) **870** acts as the central nervous system of the system **800**, providing centralized, efficient management and controls of the gatherers and the ISMs. The CEM **870** can perform one or more of the following tasks.

- Coordinates, controls, and manages the data collection process. The CEM **870** coordinates the operation of the gatherers and manages the flow of data through the system **800** through the collection scheme defined in the system configuration. The latter includes the configuration of the gatherers, the ISMs, the network devices, the fields in the central database **875** (described below), and the enhancement procedures. Based on the collection scheme the CEM **870** determines the system **800**'s computation flow (the set of operations the system **800** must perform to obtain the desired information). The CEM **870** then controls all the gatherers, instructing them to perform, in a particular sequence, the operations defined in the computation flow. The CEM **870** receives the records collected by the gatherers and stores them in the central database **875**. NSPs can configure the CEM **870** to merge duplicate records before storing them in the central database **875**. Record merging is described below.
- Performs clean-up and aging procedures in the database **875**. The system **800** collects and stores large amounts of session information every day. The CEM **870** removes old data to free space for new data periodically. The NSP defines the expiration period for the removal of old records. The CEM **870** is responsible for coordinating the removal of records from the central database **875**. The CEM **870** places a time stamp on every record when the record enters the central database **875** and deletes the record after the time period the NSP has defined elapses.
- Provides centralized system-wide upgrade, licensing, and data security. The NSP can perform version upgrades of the system **800** at the CEM **870**. The gatherers can be automatically upgraded once a new version is installed on the host computer of the CEM **870**. ISMs are also installed via the CEM **870** and exported to the gatherers. The CEM **870** maintains a list of licenses installed in the system and verifies periodically if the system is properly licensed. This feature lets the NSP centrally install and uninstall licenses. It also prevents unlicensed use of the system **800** and any of its components.
- Monitors the state of the gatherers and ISMs. The gatherers periodically communicate with the CEM **870**. The CEM **870** continuously monitors the state of each gatherer and network devices in the system **800**. The CEM **870** can be fault-tolerant, that is, it can recover from any system crash. It coordinates the recovery of the system **800** to its previous state.

In some embodiments, a key directory server is associated with the CEM **870**. To transfer less data between the elements of the system **800**, it is desirable that each piece of data to carry little descriptive data. For example, if IP address data is transferred between a gatherer and the CEM **870**, a description of the IP address data is typically included. In some embodiments, data name/key, type, and length descriptions are included with the actual IP address data. In other embodiments, there the key directory server reduces the amount of descriptive information being sent. Every key in the directory server has a type and a length. Fields can be identified as variable length. Therefore, data

type information need not be transmitted between elements in the system **800** if the elements use a common reference key stored in the directory server. Returning to the IP address data, by using the key directory server, elements need only send two bytes for the key id and four bytes for the actual address. Most of the data being sent in the system is relatively short in length. Therefore, the directory server helps reduce the amount of information being sent between the elements in the system **800**.

Keys can be added to the directory server. The directory server can therefore support expansion of the kinds of fields being sent by allowing system elements to update their locally stored key ids. For example, after a recipient receives a record with an "unknown" key, it contacts the directory server to get the key definition.

Central Database

The central database **875** is the optional central repository of the information collected by the system **800**. The central database **875** is but one example of a sink for the data generated in the system **800**. Other embodiments include other configurations. The central database **875** stores and maintains the data collected by the gatherers, as well as the information on the configuration of the system **800**. Thus, in configuring the system **800**, the NSP defines what data will be stored in each field in the central database **875** and how that data is collected from the ISMs.

The information on network sessions is stored in the database in the form of a table. Each field in the table represents a network session parameter. Each record describes a network session. The system **800** has a set of pre-defined fields that are configured by the CEM **870** on installation. The NSP can modify the central database **875** structure by adding, deleting, or modifying fields. The NSP access the data in the central database **875** by running queries and reports. The old data is removed from the central database **875** to free space for new data periodically. You can specify the time interval for which records are stored in the central database **875**. The structure of the central database **875** with some of the predefined fields is illustrated in the following figure.

As each IP session may generate multiple transaction records, during the merge process the CEM **870** identifies and discards duplications, enhancing the efficiency of the data repository. Generally, data records are passed through the merger program, in the CEM **870**, into the central database **875**. However, the data records are also cached so that if matching records appear at some point, the already stored records can be replaced or enhanced with the new records. The database tables that contain the record flows can be indexed, enhancing the efficiency of the data repository. A merge is achieved by matching some of the fields in a data record and then merging the matching records from at least two record flows, transforming them into one record before updating the central database **875**. In some embodiments, adaptive tolerance is used to match records. Adaptive tolerance allows for a variation in the values of fields that are compared (e.g., the time field value may be allowed to differ by some amount, but still be considered a match). The adaptive aspect of the matching can include learning the appropriate period to allow for the tolerance. The reason that the records that do not match any previous records are sent through into the central database **875**, in addition to being cached for later matching, is to avoid loss of data in case of system failure.

The system **800** supports a non-proprietary database format enabling the central database **875** to run on any of a number of commercially available databases (e.g., MS-SQL Server, Oracle Server, D132, etc.).

User Interface Server and Clients

The User Interface Server (UIS) **885** allows multiple clients (e.g. terminals **880**) to access the system **800** through, the Microsoft Internet Explorer with Java™ Plug-in or Netscape Navigator with Java™ Plug-in. Other embodiments can use other applications to access the system **800**. The main function of the UIS **885** is to provide remote and local platform independent control for the system **800**. The UIS **885** can provide these functions through windows that correspond to the various components of the system **800**. Access to the system **800** can be password protected, allowing only authorized users to log in to the system and protecting sensitive information.

The NSP can perform one or more of the following main tasks through the UIS **885**:

Configure the system **800**.

Create and run queries and reports on network activity and resource consumption.

Register and license the system **800**.

Data Distillation

FIG. **9** illustrates the data distillation process performed by the system of FIG. **7**. The data distillation aggregates and correlates information from many different network devices to compile data useful in billing and network accounting.

First, the ISMs **910** gather data from their corresponding network device. Note that for some ISMs (e.g. pipe ISMs), real-time, policy-based filtering and aggregation **915** can also be done. This data is then fed to the gatherers **920**. The gatherers **920** perform data enhancement to complete the data from the ISMs **910**. The results are provided to the CEM **870**. The CEM **870** performs data merges **970** to remove redundant data. The merged data is then optionally stored in the central database **875** as a billing record **975** or is sent directly to an external system. The billing record information can be accessed from external applications, through the application interface **990**, via a data record **980**. Filtering and/aggregation and/or data enhancements can be done at any stage in the system **800**.

Data Enhancement

As mentioned above, the gatherers **920** provide data enhancement features to complete information received from the ISMs **910**. The following describes some example data enhancement techniques used in some embodiments of the invention.

FIG. **10** illustrates an example of data enhancement. Data enhancement comprises a number of field enhancements. A field enhancement specifies how the data obtained from the trigger of the enhancement procedure is processed before it is placed in a single field in the central database **875**. The data can be placed in the field directly, or new information may be added to the record by applying a Synchronous ISM function. (In the example below, the function resolves the IP address to a host FQDN"). Field enhancements may involve one or multiple steps. There is no limit to the number of steps in a Field Enhancement. The data record starts with fields obtained from an asynchronous ISM **1000**. The fields in the DR **1000** are then enhanced using the field enhancements. The enhanced fields result in the DR **1020**.

A visual representation of an enhancement can be presented to the NSP. The enhancement may include an itinerary of ISMs starting off with an AISM, passing through PISMs, and terminating in the CEM **870**. Using this view of the system **800**, the NSP need not be shown the actual flow of data since the flow may be optimized later in order to achieve better performance. This is more of a graphical logical view of how the enhancement is achieved in steps. (PISMs can terminate more than one flow and initiate more than one flow.)

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A visual representation of a field enhancement shows the per-field flow of data correlation. This process ends in the CEM **870** or in a PISM. The NSP supplies information telling the system **800** how to reach each of the terminating fields (in the CEM **870** or the PISM) starting off from the initiating fields (PISM or AISM). Each step of enhancement defines cross correlation with some SISM function.

FIG. **11**A illustrates various field enhancements (**1110** through **1140**). A field enhancement includes applying zero or more functions to a field before storing the field in a specified field in the central database **875**.

One-step Field Enhancement **1110**. The initial source data from the asynchronous ISM is placed directly in a field in the central database **875**. Example: the field enhancement for the Source IP field.

Two-step Field Enhancement **1120**. The initial source data from the asynchronous ISM is used to obtain new additional data from a synchronous network device and the new data is placed in a field in the central database **875**. Example: the field enhancement for the Source Host field.

Three-step Enhancement **1130**. The initial source data from the asynchronous ISM is used to obtain additional data from a synchronous ISM. The result is used to obtain more data from another ISM and the result is placed in a field in the central database **875**.

The following illustrates an example data enhancement. Suppose the data obtained from a proxy server **801** contains the source IP address of a given session, such as 199.203.132.2, but not the complete domain address of the host computer (its Fully Qualified Domain Name), such as www.xacct.com. The name of the host can be obtained by another network device—the Domain Name System (DNS **802**) server. The DNS server **802** contains information that matches IP addresses of host computers to their Fully Qualified Domain Names (FQDNs). Through an enhancement procedure the information collected from the proxy server **801** can be supplemented by the information from the DNS**802**. Therefore, the name of the host is added to the data (the data record) collected from the proxy server **801**. The process of adding new data to the data record from different network devices can be repeated several times until all required data is collected and the data record is placed in the central database **875**.

FIG. **11**B illustrates another example data enhancement where an enhanced record **1190** is created from an initial netflow record **1192**. Fields in the enhanced record **1190** are enhanced from the radius record **1194**, the QoS policy server record **1196**, the NMS DI3 record **1198**, and the LDAP record **1199**.

Defining Enhancement Procedures

The following describes the process for defining enhancement procedures in some embodiments of the system. Typically defining an enhancement procedure for the system **800** includes (1) defining enhancement procedures for each asynchronous ISM and (2) configuring field enhancements for all fields in the central database **875** for which the NSP wants to collect data originating from an asynchronous ISM that triggers the corresponding enhancement procedure.

An enhancement procedure can be defined as follows.

1. Access the CEM **870** using the UIS **880**.
2. Select the enhancement procedures list using the UIS **880**.
3. Define the name of the new enhancement procedure.
4. Select a trigger for the new enhancement procedure. The trigger can correspond to any asynchronous ISM in the system **800**. Alternatively, the trigger can correspond to any asynchronous ISM in the system **800** that has not already been assigned to an enhancement procedure.
5. Optionally, a description for the enhancement procedure can be provided.
6. The new enhancement procedure can then be automatically populated with the existing fields in the central database **875**. Optionally, the NSP can define the fields (which could then be propagated to the central database **875**). Alternatively, based upon the type of asynchronous ISM, a preset set of fields could be proposed to the NSP for editing. What is important is that the NSP can define field procedures to enhance the data being put into the data records of the central database **875**.
7. The NSP can then define the field enhancements for every field in the new enhancement procedure for which the NSP wants to collect data from the ISM that is the trigger of the new enhancement procedure.

Defining Field Enhancements

Defining a field enhancement involves specifying the set of rules used to fill a database field from the information obtained from the trigger of the enhancement procedure. The NSP defines field enhancements for each field in which NSP wants to collect data from the trigger. If no field enhancements are defined, no data from the trigger will be collected in the fields. For example, suppose the firewall asynchronous ISM **830** that triggers an enhancement procedure. Suppose the central database **875** has the following fields: source IP, source host, destination IP, destination host, user name, total bytes, service, date/time, and URL If the NSP wants to collect session data for each field except the URL from the firewall ISM **830**, which triggers the enhancement procedure, the NSP defines a field enhancement for each field with the exception of the URL.

In some embodiments, the field enhancements are part of the enhancement procedure and the NSP can only define and modify them when the enhancement procedure is not enabled.

The field enhancements can be defined in a field enhancement configuration dialog box. The field enhancement configuration dialog box can have two panes. The first displays the name of the enhancement procedure, the name of its trigger, and the name and data type of the field for which the NSP is defining the field enhancement. The second is dynamic and interactive. Its content changes depending on the NSP's input. When first displayed, it has two toggle buttons, End and Continue, and a list next to them. The content of the list depends on the button depressed.

When End is depressed, the list contains all output fields whose data type matches the data type of the field for which the NSP is defining the field enhancement. For example, if the field's data type is IP Address, the list contains all fields that are of the same type, such as source IP and destination IP that the AISM supplies. The fields in the list can come from two sources: (1) the source data which the gatherer receives from the trigger and (2) the result obtained by applying a synchronous ISM function as a preceding step in the field enhancement. The following notation is used for the fields:

OutputFieldName for the output of a field origination from the trigger

SISName. FunctionName (InputArgument). OutputField for the output of a field that is the result of applying a function

SISName . . . OutputField for the output of a field that is the result of applying a function as the final step of a field enhancement. The following examples are presented.

Source IP is the field provided by the trigger of the enhancement procedure that contains the IP address of the source host.

DNS . . . Host Name and DNS.Name(Source IP).Host name are the names of a field originating from the resolved function Name of a network device called DNS that resolves the IP address to a domain address. The input argument of the function is the field provided by the trigger of the enhancement procedure, called source IP. It contains the IP address of the source host. The function returns the output field called Host Name that contains the domain address of the source host. The notation DNS . . . Host Name is used when the field is the result of applying the function as the final step of a field enhancement. The notation is DNS.Name (Source IP).Host Name is used when the field is used as the input to another function.

In the user interface, if End is unavailable, none of the output fields matches the data type of the field.

When Continue is depressed, the list contains all applicable functions of the available synchronous network device configured in the system **800**. If the preceding output does not match the input to a function, it cannot be applied and does not appear on the list.

The following notation is used for the functions.

SISName.FunctionName
(InputFieldName:InputFieldDataType)
(OutputFieldName.-OutputFieldDataType)

When the function has multiple input and/or output arguments, the notation reflects this. The arguments are separated by commas.

The following example shows a field enhancement.

DNS. Address(Host Name:String)→(IP Address:IP Address)

Where DNS is the name of the synchronous ISM (or network device) as it appears in the system configuration.

Address is the name of the function.

(Host Name:String) is the input to the function-host FQDN of data typeString

(IP Address:IP Address) is the output-IP address of data type IPAddress

The NSP can define the field enhancement by choosing items from the list. The list contains the option <none> when the End button is depressed. Choosing this option has the same effect as not defining a field enhancement: no data from the trigger will be stored in the field in the central database **875**.

Additional Embodiments

The following describes additional embodiments of the invention.

In some embodiments, the user interface used by an NSP to configure the system **800** can be presented as a graphical representation of the data enhancement process. Every step in the enhancement can be shown as a block joined to another block (or icon or some graphical representation). The properties of a block define the operations within the block. In some embodiments, the entire data enhancement process from network devices to the central database **875** can be shown by linked graphics where the properties of a graphic are the properties of the enhancement at that stage.

In some embodiments, multiple CEMs **870** and/or central databases **875** can be used as data sources (back ends) for datamart or other databases or applications (e.g., customer care and billing systems).

In some embodiments, the types of databases used are not necessarily relational. Object databases or other databases can be used.

In some embodiments, other platforms are used. Although the above description of the system **800** has been IP network focused with Unix or Windows NT systems supporting the elements, other networks (non-IP networks) and computer platforms can be used. What is important is that some sort of processing and storing capability is available at the gatherers, the CEMs, the databases, and the user interface servers.

In some embodiments, the gatherers and other elements of the system **800**, can be remotely configured, while in other embodiments, some of the elements need to be configured directly. For example, a gatherer may not be remotely configurable, in which case, the NSP must interface directly with the computer running the gatherer.

In other embodiments, the general ideas described herein can be applied to other distributed data enhancement problems. For example, some embodiments of the invention could be used to perform data source extraction and data preparation for data warehousing applications. The gatherers would interface with ISMs that are designed to extract data from databases (or other data sources). The gatherers would perform filtering and aggregation depending upon the needs of the data mart (in such an embodiment, the central database and CEM could be replaced with/used with a data mart). The data enhancement.

While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

What is claimed is:

1. A method for generating a single record reflecting multiple services for accounting purposes, comprising:

(a) identifying a plurality of services carried out over a network;

(b) collecting data describing the plurality of services; and

(c) generating a single record including the collected data, wherein the single record represents each of the plurality of services.

2. The method as recited in claim **1**, and further comprising sending the single record to a Business Support System.

3. The method as recited in claim **1**, wherein the single record is used to bill at least one recipient of the services.

4. The method as recited in claim **1**, wherein the plurality of services are received by a single party associated with the single record.

5. The method as recited in claim **4**, wherein the single party is identified in the record.

6. The method as recited in claim **1**, and further comprising collecting a plurality of the single records, and generating a distinct record including the collected data of each of the single records, wherein the distinct record represents each of the plurality of single records.

7. A computer program product embedded into computer readable medium for generating a single record reflecting multiple services for accounting purposes, comprising:

(a) computer code for identifying a plurality of services carried out over a network;

(b) computer code for collecting data describing the plurality of services; and

(c) computer code for generating a single record including the collected data, wherein the single record represents each of the plurality of services;

wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, an instant

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messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;

wherein the data is collected utilizing an enhancement procedure defined utilizing a graphic user interface by: listing a plurality of available functions to be applied in real-time prior to end-user reporting,

allowing a user to choose at least one of a plurality of fields, and

allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.

8. The computer program product as recited in claim **7**, and further comprising computer code for sending the single record to a Business Support System.

9. The computer program product as recited in claim **7**, wherein the single record is used to bill at least one recipient of the services.

10. The computer program product as recited in claim **7**, wherein the plurality of services are received by a single party associated with the single record.

11. The computer program product as recited in claim **10**, wherein the single party is identified in the record.

12. The computer program product as recited in claim **7**, and further comprising computer code for collecting a plurality of the single records, and computer code for generating a distinct record including the collected data of each of the single records, wherein the distinct record represents each of the plurality of single records.

13. A system comprising computer readable medium for generating a single record reflecting multiple services for accounting purposes, comprising:

(a) logic for identifying a plurality of services carried out over a network;

(b) logic for collecting data describing the plurality of services; and

(c) logic for generating a single record including the collected data, wherein the single record represents each of the plurality of services;

wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;

wherein the data is collected utilizing an enhancement procedure defined utilizing a graphic user interface by: listing a plurality of available functions to be applied in real-time prior to end-user reporting,

allowing a user to choose at least one of a plurality of fields, and allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.

14. The system as recited in claim **13**, and further comprising logic for sending the single record to a Business Support System.

15. The system as recited in claim **13**, wherein the single record is used to bill at least one recipient of the services.

16. The system as recited in claim **13**, wherein the plurality of services are received by a single party associated with the single record.

17. The system as recited in claim **16**, wherein the single party is identified in the record.

18. The system as recited in claim **13**, and further comprising logic for collecting a plurality of the single records, and logic for generating a distinct record including the collected data of each of the single records, wherein the distinct record represents each of the plurality of single records.

19. A method for generating a single record reflecting multiple services, comprising:

(a) collecting data with different formats describing a plurality of services, wherein the services are selected from the group consisting of an hypertext transfer protocol (HTTP) session, electronic mail session, a multimedia streaming session, and voice over Internet Protocol (IP) session;

(b) collecting data with different formats describing users of the services;

(c) generating a single record including the collected data representing each of the services and the users;

(d) collecting a plurality of the single records;

(e) generating a distinct record including the collected data of each of the single records, wherein the distinct record represents each of the plurality of single records; and

(f) sending the distinct record to a Business Support System.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,836,797 B2
APPLICATION NO. : 10/040297
DATED : December 28, 2004
INVENTOR(S) : Givoly et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the claims:
col. 16, line 37 replace “services.” with --services;
wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;
wherein the data is collected utilizing an enhancement procedure defined utilizing a graphical user interface by:
listing a plurality of available functions to be applied in real-time prior to end-user reporting,
allowing a user to choose at least one of a plurality of fields, and
allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.--;

col. 18, line 28 remove --, wherein the services are selected from the group consisting of an hypertext transfer protocol (HTTP) session, electronic mail session, a multimedia streaming session, and voice over Internet Protocol (IP) session-- after “services”;

col. 18, line 43 replace “System.” with --System;
wherein the services include a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;
wherein the data is collected utilizing an enhancement procedure defined utilizing a graphical user interface by:
listing a plurality of available functions to be applied in real-time prior to end-user reporting,
allowing a user to choose at least one of a plurality of fields, and
allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.--.

Signed and Sealed this

Twenty-second Day of June, 2010

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office

APPEAL,CLOSED,JURY,PATENT

U.S. District Court
Eastern District of Virginia − (Alexandria)
CIVIL DOCKET FOR CASE #: 1:10−cv−00910−LMB−TRJ

Amdocs (Israel) Limited v. Openet Telecom, Inc. et al
Assigned to: District Judge Leonie M. Brinkema
Referred to: Magistrate Judge Thomas Rawles Jones, Jr
Case in other court: Federal Circuit, 13−01212
Federal Circuit, 15−01180
Cause: 35:271 Patent Infringement

Date Filed: 08/16/2010
Date Terminated: 10/24/2014
Jury Demand: Both
Nature of Suit: 830 Patent
Jurisdiction: Federal Question

Plaintiff

Amdocs (Israel) Limited
an Israeli Corporation

represented by

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Defendant

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an Irish Corporation

represented by **Adrienne Gail Johnson**
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ATTORNEY TO BE NOTICED

Brian Himanshu Pandya
(See above for address)
ATTORNEY TO BE NOTICED

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Joseph Shin
(See above for address)
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Counter Claimant

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a Delaware Corporation

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ATTORNEY TO BE NOTICED

Joseph Shin
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ATTORNEY TO BE NOTICED

Brian Himanshu Pandya
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Counter Defendant

Amdocs (Israel) Limited
an Israeli Corporation

represented by **Gregory Hayes Lantier**
(See above for address)
ATTORNEY TO BE NOTICED

Date Filed	#	Docket Text
08/16/2010	1	COMPLAINT against Openet Telecom LTD., Openet Telecom, Inc. (Filing fee $ 350 receipt number 14683015525.), filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Civil Cover Sheet, # 4 Receipt)(tche) (Entered: 08/16/2010)
08/16/2010	2	Summons Issued for service by SPS as to Openet Telecom LTD., Openet Telecom, Inc. (tche) (Entered: 08/16/2010)
08/16/2010	3	Financial Interest Disclosure Statement (Local Rule 7.1) by Amdocs (Israel) Limited. (tche) (Entered: 08/16/2010)

08/16/2010	4	Report on the filing or determination of an action regarding patent(s) 6,836,797 &7,631,065. (tche) (Entered: 08/16/2010)
11/09/2010	5	CERTIFICATE of Service *Copy of Complaint on Openet, Inc.* by Gregory Hayes Lantier on behalf of Amdocs (Israel) Limited (Lantier, Gregory) (Entered: 11/09/2010)
11/09/2010	6	CERTIFICATE of Service *Copy of Complaint on Openet Telecom Ltd.* by Gregory Hayes Lantier on behalf of Amdocs (Israel) Limited (Lantier, Gregory) (Entered: 11/09/2010)
11/10/2010		Notice of Correction re 5 Certificate of Service, 6 Certificate of Service. −− The filing user has been notified and reminded that Affidavits of Service are an exception to electronic filing and has been asked to file the original document with the Clerk's Office in paper form. (tche) (Entered: 11/10/2010)
11/12/2010	7	Affidavit of Service; Openet Telecom, Inc. served on 11/3/2010, answer due 11/24/2010. (tche) (Entered: 11/12/2010)
11/12/2010	8	Affidavit of Service; Openet Telecom LTD. served on 11/3/2010, answer due 11/24/2010. (tche) (Entered: 11/12/2010)
11/24/2010	9	ANSWER to 1 Complaint with Jury Demand, COUNTERCLAIM against Amdocs (Israel) Limited by Openet Telecom, Inc..(Pandya, Brian) (Entered: 11/24/2010)
11/24/2010	10	ANSWER to 1 Complaint with Jury Demand by Openet Telecom LTD..(Pandya, Brian) (Entered: 11/24/2010)
11/24/2010	11	Financial Interest Disclosure Statement (Local Rule 7.1) by Openet Telecom, Inc.. (Pandya, Brian) (Entered: 11/24/2010)
11/24/2010	12	Financial Interest Disclosure Statement (Local Rule 7.1) by Openet Telecom LTD.. (Pandya, Brian) (Entered: 11/24/2010)
12/01/2010	13	ORDER GRANTING Pro hac vice of James Harold Wallace, Jr.; Filing fee $ 50, receipt number 14683017922. Signed by District Judge Leonie M. Brinkema on 12/1/2010. (Attachments: # 1 Receipt)(tche) (Entered: 12/01/2010)
12/01/2010	14	ORDER GRANTING Pro hac vice of Anthony Hyeok Son; Filing fee $ 50, receipt number 14683017922. Signed by District Judge Leonie M. Brinkema on 12/1/2010. (Attachments: # 1 Receipt)(tche) (Entered: 12/01/2010)
12/01/2010	15	SCHEDULING ORDER: Initial Pretrial Conference set for 12/22/2010 at 11:00 AM before Magistrate Judge Thomas Rawles Jones Jr. Final Pretrial Conference set for 4/21/2011 at 10:00 AM before District Judge Leonie M. Brinkema. Discovery due by 4/15/2011. Signed by District Judge Leonie M. Brinkema on 12/1/2010. (Attachments: # 1 Pretrial Notice, # 2 Magistrate Consent Form)(tche) (Entered: 12/01/2010)
12/15/2010	16	ANSWER to Counterclaim re 9 Answer to Complaint, Counterclaim by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 12/15/2010)
12/15/2010	17	Joint Discovery Plan by Amdocs (Israel) Limited, Openet Telecom LTD., Openet Telecom, Inc.(Lantier, Gregory) (Entered: 12/15/2010)
12/17/2010	18	Joint Discovery Plan by Amdocs (Israel) Limited, Openet Telecom LTD, Openet Telecom, Inc. (Attachments: # 1 Appendix Draft Stipulated Protective Order)(Lantier, Gregory) (Entered: 12/17/2010)
12/20/2010	19	ORDER GRANTING Pro hac vice of Nels Thomas Lippert; Filing fee $ 50, receipt number 14683018358. Signed by District Judge Leonie M. Brinkema on 12/20/2010. (Attachments: # 1 Receipt)(tche) (Entered: 12/20/2010)
12/20/2010	20	ORDER GRANTING Pro hac vice of Laura Ann Sheridan; Filing fee $ 50, receipt number 14683018358. Signed by District Judge Leonie M. Brinkema on 12/20/2010. (Attachments: # 1 Receipt)(tche) (Entered: 12/20/2010)

12/20/2010	21	NOTICE of Appearance by Joseph Shin on behalf of Openet Telecom, Inc. (Shin, Joseph) (Main Document 21 replaced on 12/20/2010) (tche,). (Entered: 12/20/2010)
12/20/2010	22	NOTICE of Appearance by Joseph Shin on behalf of Openet Telecom LTD. (Shin, Joseph) (Main Document 22 replaced on 12/20/2010) (tche,). (Entered: 12/20/2010)
12/20/2010		Notice of Correction re 21 Notice of Appearance, 22 Notice of Appearance. −The filing user has been notified that documents 21 and 22 were incorrectly saved PDF fillable forms and have been removed. The filing user was directed to refile the documents.(tche) (Entered: 12/20/2010)
12/20/2010	23	NOTICE of Appearance by Joseph Shin on behalf of Openet Telecom, Inc. (Shin, Joseph) (Entered: 12/20/2010)
12/20/2010	24	NOTICE of Appearance by Joseph Shin on behalf of Openet Telecom LTD. (Shin, Joseph) (Entered: 12/20/2010)
12/22/2010	25	Minute Entry for proceedings held before Magistrate Judge Thomas Rawles Jones, Jr: Initial Pretrial Conference held on 12/22/2010. Appearances of counsel. Protective order excluding in−house counsel and sealing provisions to be filed by Monday, 12/27/10. Confidential provisions to be included in the Rule 16b order. Any motion to amend or to join a party to be filed by 01/18/11. All general objections to discovery requests overruled in advance (except as to privilege.) Order to issue. (cmar,) (Entered: 12/22/2010)
12/22/2010	26	Rule 16(b) Scheduling Order − Pursuant to the Rule 16(b) Conference it is ordered that a) Parties shall deliver to my chambers (not to the Clerks office) a copy of every non−dispositive motion and every document relating to such a motion within one business day of filing it. b) Rule 26(a) disclosures, depositions, interrogatories, requests for documents and admissions, and answers thereto shall not be filed except on order of the court, or for use in a motion or at trial. c) Any motion to amend the pleadings or to join a party shall be made by January 18, 2011. d) Rule 26(a)(1) disclosures shall be completed by December 22, 2010. They shall be augmented as agreed in the joint discovery plan and as directed at the conference. e) Expert discovery shall be conducted on the schedule agreed to in the joint discovery plan. f) Because the discovery plan does not show that the parties have discussed any issues relating to claims of privilege or protection of trial preparation materials, as required by Fed. R. Civ. P. 26(f)(3)(D), counsel are directed to report on that subject to the undersigned magistrate judge within fourteen (14) days. g) Because the discovery plan does not show that the parties have discussed any issues relating to preserving discoverable information, as required by Fed. R. Civ. P. 26(f)(2), counsel are directed to report on that subject to the undersigned magistrate judge within fourteen (14) days. h) Access to discovery materials designated confidential is restricted to outside counsel and their staffs until a more detailed protective order is entered. i) Claim construction and summary judgment motions will be briefed and argued together on a schedule that Judge Brinkema will set at the final pretrial conference. (SEE ORDER FOR DETAILS.) Signed by Magistrate Judge Thomas Rawles Jones, Jr on 12/22/10. (cmar,) (Entered: 12/22/2010)
12/27/2010	27	Joint MOTION for Protective Order *(Stipulated Proposed Protective Order)* by Openet Telecom LTD., Openet Telecom, Inc.. (Pandya, Brian) (Entered: 12/27/2010)
01/05/2011	28	NOTICE by Openet Telecom, Inc. *Joint Supplement to Discovery Plan* (Pandya, Brian) (Entered: 01/05/2011)
01/14/2011	29	MOTION to Compel *Compliance with Disclosures Regarding Priority Dates Required by Rule 16(b) Scheduling Order* by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit Exhibit A)(Pandya, Brian) (Entered: 01/14/2011)
01/14/2011	30	Request for Hearing by Openet Telecom LTD., Openet Telecom, Inc. re 29 MOTION to Compel *Compliance with Disclosures Regarding Priority Dates Required by Rule 16(b) Scheduling Order* (Pandya, Brian) (Entered: 01/14/2011)

01/18/2011		Set Deadlines as to 29 MOTION to Compel *Compliance with Disclosures Regarding Priority Dates Required by Rule 16(b) Scheduling Order*. Motion Hearing set for 1/21/2011 at 10:00 AM before Magistrate Judge Thomas Rawles Jones Jr. (clar,) (Entered: 01/18/2011)
01/18/2011		MOTIONS REFERRED to Magistrate Judge: Jones. 29 MOTION to Compel *Compliance with Disclosures Regarding Priority Dates Required by Rule 16(b) Scheduling Order* (clar,) (Entered: 01/18/2011)
01/18/2011	31	MOTION for Leave to File *Amended Complaint* by Amdocs (Israel) Limited. (Attachments: # 1 Supplement Memorandum in Support of Motion for Leave to Amend, # 2 Proposed Order Proposed Order Granting Leave to File an Amended Complaint, # 3 Exhibit Exhibit 1: Amended Complaint, # 4 Exhibit Exhibit 2, # 5 Exhibit Exhibit 3)(Lantier, Gregory) (Entered: 01/18/2011)
01/18/2011	32	Unopposed MOTION for Leave to File *Amend Pleadings (Amended Answer/Counterclaims)* by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit Proposed Amended Pleading of Openet Telecom, Inc., # 2 Exhibit Proposed Amended Pleading of Openet Telecom Ltd.)(Pandya, Brian) Modified text on 1/19/2011 (klau,). (Entered: 01/18/2011)
01/19/2011		Notice of Correction re 31 MOTION for Leave to File *Amended Complaint*, The filing user has been notified to file the Memorandum in Support separately for future filing. The filing user has been notified to file a Notice of Hearing Date or a Notice of Waiver of Oral Argument (klau,) (Entered: 01/19/2011)
01/19/2011	33	Memorandum in Opposition re 29 MOTION to Compel *Compliance with Disclosures Regarding Priority Dates Required by Rule 16(b) Scheduling Order* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit Openet Augmented Initial Disclosures, # 2 Exhibit Amdocs Augmented Initial Disclosures)(Lantier, Gregory) (Entered: 01/19/2011)
01/19/2011		Reset Deadlines as to 29 MOTION to Compel *Compliance with Disclosures Regarding Priority Dates Required by Rule 16(b) Scheduling Order*. Motion Hearing set for 1/24/2011 at 03:30 PM before Magistrate Judge Thomas Rawles Jones Jr. (clar,) (Entered: 01/19/2011)
01/19/2011	34	Notice of Hearing Date re 31 MOTION for Leave to File *Amended Complaint* (Lantier, Gregory) (Entered: 01/19/2011)
01/19/2011		Per TRJ chambers motion (#29) set for 1/24/11 under advisement (clar,) (Entered: 01/19/2011)
01/19/2011	35	STIPULATED PROTECTIVE ORDER without sealing provisions re: Handling and labeling of confidential materials (see order for details). Signed by Magistrate Judge Thomas Rawles Jones, Jr on 1/19/2011. (klau,) (Entered: 01/19/2011)
01/20/2011		Set Deadlines as to 31 MOTION for Leave to File *Amended Complaint*. Motion Hearing set for 1/28/2011 at 10:00 AM before Magistrate Judge Thomas Rawles Jones Jr. (clar,) (Entered: 01/20/2011)
01/20/2011		MOTIONS REFERRED to Magistrate Judge: Jones. 31 MOTION for Leave to File *Amended Complaint* (clar,) (Entered: 01/20/2011)
01/20/2011		Notice of Correction re 33 Memorandum in Opposition. − The filing user has been notified to file a separate Certificate of Service.(tche) (Entered: 01/20/2011)
01/21/2011	36	First MOTION to Compel *Inventor Depositions* by Openet Telecom LTD., Openet Telecom, Inc.. (Pandya, Brian) (Entered: 01/21/2011)
01/21/2011	37	Notice of Hearing Date *1/28/2011, 10:00 AM EST* re 36 First MOTION to Compel *Inventor Depositions* (Pandya, Brian) (Entered: 01/21/2011)
01/24/2011		Set Deadlines as to 36 First MOTION to Compel *Inventor Depositions*. Motion Hearing set for 1/28/2011 at 10:00 AM before Magistrate Judge Thomas Rawles Jones Jr. (clar,) (Entered: 01/24/2011)

01/24/2011		MOTIONS REFERRED to Magistrate Judge: Jones. 36 First MOTION to Compel *Inventor Depositions* (clar,) (Entered: 01/24/2011)
01/25/2011	38	ORDER denying 29 MOTION to Compel Compliance with Disclosures Regarding Priority Dates Required by Rule 16(b) Scheduling Order. Defendants motion is MOOT; as to barring plaintiff from alleging earlier dates, defendants motion is DENIED. It is so ORDERED. Signed by Magistrate Judge Thomas Rawles Jones, Jr on 1/25/2011. (tche) (Entered: 01/26/2011)
01/26/2011	39	RESPONSE to Motion re 31 MOTION for Leave to File *Amended Complaint* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Pandya, Brian) (Entered: 01/26/2011)
01/26/2011	40	Memorandum in Opposition re 36 First MOTION to Compel *Inventor Depositions* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit Exhibit 1, # 2 Exhibit Exhibit 2, # 3 Exhibit Exhibit 3, # 4 Exhibit Exhibit 4, # 5 Exhibit Exhibit 5, # 6 Exhibit Exhibit 6, # 7 Exhibit Exhibit 7)(Lantier, Gregory) (Entered: 01/26/2011)
01/27/2011	41	REPLY to Response to Motion re 31 MOTION for Leave to File *Amended Complaint* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit 1, # 2 Exhibit 2)(Lantier, Gregory) (Entered: 01/27/2011)
01/27/2011	42	Reply to Motion re 36 First MOTION to Compel *Inventor Depositions* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit Exhibit A)(Pandya, Brian) (Entered: 01/27/2011)
01/28/2011	43	Minute Entry for proceedings held before Magistrate Judge Thomas Rawles Jones, Jr: Motion Hearing held on 1/28/2011 re 31 MOTION for Leave to File *Amended Complaint* filed by Amdocs (Israel) Limited, 36 First MOTION to Compel *Inventor Depositions* filed by Openet Telecom LTD., Openet Telecom, Inc. Appearances of counsel. Motion to compel argued and treated also as motion for a protective order − GRANTED. Order to follow. Motion for leave to amend argued and GRANTED. Proposed order to be submitted by counsel re: schedule/dates. (Tape #FTR.) (cmar,) (Entered: 01/28/2011)
01/28/2011	44	For the reasons stated from the bench, and in accord with specific rulings made at that time, it is ORDERED that plaintiffs motion to compel (no. 36), treated also as a motion for a protective order, is GRANTED. Signed by Magistrate Judge Thomas Rawles Jones, Jr on 01/28/11. (cmar,) (Entered: 01/28/2011)
01/28/2011	47	ORDER GRANTING Pro hac vice of Samuel Calvin Walden; Filing fee $ 50, receipt number 14683019080. Signed by District Judge Leonie M. Brinkema on 1/28/2011. (Attachments: # 1 Receipt)(tche) (Entered: 01/31/2011)
01/29/2011	45	TRANSCRIPT of proceedings held on 1/28/2011 before Judge Jones. Transcriber Anneliese Thomson, telephone number 703−299−8595. Transcript may be viewed at the court public terminal or purchased through the Transcriber before the deadline for Release of Transcript Restriction. After that date it may be obtained through PACER Redaction Request due 2/28/2011. Redacted Transcript Deadline set for 3/31/2011. Release of Transcript Restriction set for 4/29/2011.(thomson, anneliese) (Entered: 01/29/2011)
01/31/2011	46	Notice of Filing of Official Transcript re 45 Transcript. (tche) (Entered: 01/31/2011)
01/31/2011	48	Discovery Plan *(Proposed Supplemental Scheduling Order)* by Amdocs (Israel) Limited.(Lantier, Gregory) (Entered: 01/31/2011)
02/02/2011	49	SUPPLEMENTAL SCHEDULING ORDER: For the reasons stated at the January 28, 2011 hearing, the discovery schedule is amended as follows: 1) On or before February 4, 2011, Plaintiff Amdocs (Israel) Limited (Amdocs) shall serve on the defendants Openet Telecom, Inc. And Openet Telecom Ltd. (Collectively, Openet) infringement contentions for U.S. Patent Nos. 6,947,984 (984 patent and 7,412,510 (510 patent). 2) On or before February 18, 2011, Openet shall serve invalidity contentions on Amdocs or the 984 and 510 patents. 3) On or before February 28, 2011, Amdocs shall serve on Openet anidentification of each accused product for each asserted claim of eachpatent−in−suit. It is so ORDERED. Signed by Magistrate Judge Thomas Rawles Jones, Jr on 02/02/11. (cmar,) (Entered:

		02/02/2011)
02/03/2011	50	AMENDED COMPLAINT against Openet Telecom LTD., Openet Telecom, Inc., filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D)(Lantier, Gregory) (Entered: 02/03/2011)
02/03/2011	51	AMENDED ANSWER to 1 Complaint *for Patent Infringement*, Amended COUNTERCLAIM against Amdocs (Israel) Limited by Openet Telecom, Inc.. (Pandya, Brian) (Entered: 02/03/2011)
02/03/2011	52	AMENDED ANSWER to 1 Complaint *for Patent Infringement* by Openet Telecom LTD.. (Pandya, Brian) (Entered: 02/03/2011)
02/10/2011	53	ORDER GRANTING Pro hac vice application of Victor Frank Souto ; Filing fee $ 50, receipt number 14683019385. Signed by District Judge Leonie M. Brinkema on 2/10/2011. (Attachments: # 1 Receipt)(tche) (Entered: 02/11/2011)
02/17/2011	54	ANSWER to Counterclaim by Amdocs (Israel) Limited(an Israeli Corporation).(Lantier, Gregory) (Entered: 02/17/2011)
02/22/2011	55	ANSWER to Complaint with Jury Demand, COUNTERCLAIM against Amdocs (Israel) Limited by Openet Telecom, Inc.(a Delaware Corporation).(Pandya, Brian) (Entered: 02/22/2011)
02/22/2011	56	ANSWER to Complaint with Jury Demand by Openet Telecom LTD..(Pandya, Brian) (Entered: 02/22/2011)
03/02/2011	57	ORDER granting 31 Motion for Leave to File. Signed by Magistrate Judge Thomas Rawles Jones, Jr on 3/2/2011. (Jones, Thomas) (Entered: 03/02/2011)
03/02/2011	58	ORDER granting 32 Motion for Leave to File. Signed by Magistrate Judge Thomas Rawles Jones, Jr on 3/2/2011. (Jones, Thomas) (Entered: 03/02/2011)
03/10/2011	59	ANSWER to Counterclaim re 55 Answer to Complaint, Counterclaim by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 03/10/2011)
03/11/2011		Set Hearings: Settlement Conference set for 3/29/2011 at 01:30 PM before Magistrate Judge Thomas Rawles Jones Jr. (cmar,) (Entered: 03/11/2011)
03/18/2011	60	MOTION to Compel *30(b)(6) Testimony and Interrogatory Responses* by Amdocs (Israel) Limited. (Attachments: # 1 Supplement Certificate of Service)(Lantier, Gregory) (Entered: 03/18/2011)
03/18/2011	61	Notice of Hearing Date re 60 MOTION to Compel *30(b)(6) Testimony and Interrogatory Responses* (Lantier, Gregory) (Entered: 03/18/2011)
03/21/2011		Set Deadlines as to 60 MOTION to Compel *30(b)(6) Testimony and Interrogatory Responses*. Motion Hearing set for 3/25/2011 10:00 AM in Alexandria Courtroom 301 before Magistrate Judge Thomas Rawles Jones Jr. (clar,) (Entered: 03/21/2011)
03/21/2011		MOTIONS REFERRED to Magistrate Judge: Jones. 60 MOTION to Compel *30(b)(6) Testimony and Interrogatory Responses* (clar,) (Entered: 03/21/2011)
03/21/2011	62	MOTION to Seal *Memorandum in Support of Motion to Compel* by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 03/21/2011)
03/21/2011	63	Notice of Hearing Date re 62 MOTION to Seal *Memorandum in Support of Motion to Compel* (Lantier, Gregory) (Entered: 03/21/2011)
03/21/2011	64	UNDER SEAL Memorandum in Support of 60 MOTION to Compel *30(b)(6) Testimony and Interrogatory Responses* filed by Amdocs (Israel) Limited (Under Seal pending ruling on 62 motion to seal). (stas) Modified on 3/28/2012 **UNDER SEAL per Order dated 3/28/12**(klau,). (Entered: 03/21/2011)
03/22/2011		Set Deadlines as to 62 MOTION to Seal *Memorandum in Support of Motion to Compel*. Motion Hearing set for 3/25/2011 10:00 AM in Alexandria Courtroom 301 before Magistrate Judge Thomas Rawles Jones Jr. (clar,) (Entered: 03/22/2011)

03/22/2011		MOTIONS REFERRED to Magistrate Judge: Jones. 62 MOTION to Seal *Memorandum in Support of Motion to Compel* (clar,) (Entered: 03/22/2011)
03/23/2011	65	RESPONSE to Motion re 62 MOTION to Seal *Memorandum in Support of Motion to Compel* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 03/23/2011)
03/23/2011	66	Opposition to 60 MOTION to Compel *30(b)(6) Testimony and Interrogatory Responses* filed by Openet Telecom LTD., Openet Telecom, Inc. (Under Seal Pending) (clar,) (Entered: 03/24/2011)
03/24/2011	67	MOTION to Seal *Reply Brief* by Amdocs (Israel) Limited. (Lantier, Gregory) **UNDER SEAL per Order dated 3/28/12 Reply Memorandum in Support of Plaintiff's Motion to Compel 30(b)(6) Deposition Testimony and Interrogatory Responses received and placed in civil vault.** Modified on 3/24/2011 (tche). Modified text on 3/29/2012 (klau,). (Entered: 03/24/2011)
03/24/2011	68	Notice of Hearing Date re 67 MOTION to Seal *Reply Brief* (Lantier, Gregory) (Entered: 03/24/2011)
03/25/2011		Set Deadlines as to 67 MOTION to Seal *Reply Brief*. Motion Hearing set for 3/25/2011 10:00 AM in Alexandria Courtroom 301 before Magistrate Judge Thomas Rawles Jones Jr. (clar,) (Entered: 03/25/2011)
03/25/2011		MOTIONS REFERRED to Magistrate Judge: Jones. 67 MOTION to Seal *Reply Brief* (clar,) (Entered: 03/25/2011)
03/25/2011	69	Minute Entry for proceedings held before Magistrate Judge Thomas Rawles Jones, Jr: Motion Hearing held on 3/25/2011 re 60 MOTION to Compel *30(b)(6) Testimony and Interrogatory Responses* filed by Amdocs (Israel) Limited, 67 MOTION to Seal *Reply Brief* filed by Amdocs (Israel) Limited, 62 MOTION to Seal *Memorandum in Support of Motion to Compel* filed by Amdocs (Israel) Limited. Appearances of counsel. Motions to seal − taken under advisement. (Redacted documents to be filed.) Pltf's motion to compel argued and GRANTED. Order to follow. (Tape #FTR.) (cmar,) (Entered: 03/25/2011)
03/25/2011	70	For the reasons stated from the bench, and in accord with specific rulings made at that time, is is ORDERED that plaintiffs motion to compel (no. 60) is GRANTED. Signed by Magistrate Judge Thomas Rawles Jones, Jr on 03/25/11. (cmar,) (Entered: 03/25/2011)
03/25/2011	71	Memorandum in Opposition re 60 MOTION to Compel *30(b)(6) Testimony and Interrogatory Responses* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit Exh A, # 2 Exhibit Exh B, # 3 Exhibit Exh C, # 4 Exhibit Exh D, # 5 Exhibit Exh E (Filed Under Seal), # 6 Exhibit Exh F, # 7 Exhibit Exh G, # 8 Exhibit Exh H (Filed Under Seal), # 9 Exhibit Exh I (Filed Under Seal), # 10 Exhibit Exh J (Filed Under Seal), # 11 Exhibit Exh K (Filed Under Seal), # 12 Exhibit Exh L, # 13 Exhibit Exh M)(Shin, Joseph) (Entered: 03/25/2011)
03/26/2011	72	Memorandum in Support re 60 MOTION to Compel *30(b)(6) Testimony and Interrogatory Responses* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit (Under Seal), # 2 Exhibit (Under Seal), # 3 Exhibit, # 4 Exhibit, # 5 Exhibit (Under Seal), # 6 Exhibit (Under Seal), # 7 Exhibit (Under Seal), # 8 Exhibit, # 9 Exhibit, # 10 Exhibit, # 11 Exhibit (Under Seal), # 12 Exhibit, # 13 Exhibit)(Lantier, Gregory) (Entered: 03/26/2011)
03/26/2011	73	REPLY to Response to Motion re 60 MOTION to Compel *30(b)(6) Testimony and Interrogatory Responses* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit Exhibit 9, # 2 Exhibit Exhibit 10, # 3 Exhibit Exhibit 11 (Under Seal), # 4 Exhibit Exhibit 12, # 5 Exhibit Exhibit 13)(Lantier, Gregory) (Entered: 03/26/2011)
03/29/2011	74	NOTICE of Appearance by James Linwood Quarles on behalf of Amdocs (Israel) Limited (Quarles, James) (Entered: 03/29/2011)
03/29/2011		Minute Entry for proceedings held before Magistrate Judge Thomas Rawles Jones, Jr: Settlement Conference held on 3/29/2011. There were nine (9) attendees.

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		Conference lasted approximately 3.5 hours. (cmar,) (Entered: 03/30/2011)
04/11/2011		Minute Entry for proceedings held before Magistrate Judge Thomas Rawles Jones, Jr: Settlement Conference held on 4/11/2011. There were nine (9) attendees. Conference lasted 4 hours and 45 minutes. (cmar,) (Entered: 04/12/2011)
04/12/2011		Minute Entry for proceedings held before Magistrate Judge Thomas Rawles Jones, Jr: Settlement Conference held on 4/12/2011. There were nine (9) attendees. Conference lasted approximately 3.5 hours. (cmar,) (Entered: 04/12/2011)
04/12/2011	75	NOTICE of Appearance by Adrienne Gail Johnson on behalf of Openet Telecom LTD., Openet Telecom, Inc. (Johnson, Adrienne) (Entered: 04/12/2011)
04/14/2011	76	ORDERED that the discovery schedule is revised as follows: * April 22, 2011 − Rebuttal Expert Reports due. * April 29, 2011 − Completion of deposition discovery. * May 6, 2011 − File exhibit lists and witness lists −−− Exchange exhibits * May 13, 2011 − File objective to exhibits and witnesses. The final pretrial conference remains set for April 21, 2011, at 10:00 a.m Signed by Magistrate Judge Thomas Rawles Jones, Jr on 4/14/2011. (tche) (Entered: 04/14/2011)
04/21/2011	77	Minute Entry for proceedings held before District Judge Leonie M. Brinkema: Final Pretrial Conference held on 4/21/2011. Appearance of counsel. Counsel have not exchanged witness/exhibit lists; deadline has been extended. Trial estimate is 7−10 days. Jury Trial set for 7/25/2011 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (Court Reporter Thomson.) (yguy) (Entered: 04/21/2011)
04/27/2011	78	Consent MOTION for Scheduling and Final Pretrial Order by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 04/27/2011)
04/29/2011	79	Consent Scheduling and Final Pretrial Order. (See Order for further details). SO ORDERED. Signed by District Judge Leonie M. Brinkema on 4/29/2011. (tche) (Entered: 04/29/2011)
04/29/2011		Set Hearings: −Jury Trial set for 7/25/2011 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. − Markman Hearing set for 7/8/2011 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (tche) (Entered: 04/29/2011)
04/29/2011		Set Hearing: − Summary Judgment Hearing set for 7/8/2011 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (tche) (Entered: 04/29/2011)
05/13/2011	80	Statement of Undisputed Facts by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 05/13/2011)
05/13/2011	81	*Pre−Trial* Witness List by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 05/13/2011)
05/13/2011	82	*Pre−Trial* Exhibit List by Openet Telecom LTD., Openet Telecom, Inc... (Shin, Joseph) (Entered: 05/13/2011)
05/13/2011	83	*Pre−trial* Witness List by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 05/13/2011)
05/13/2011	84	Exhibit List by Amdocs (Israel) Limited.. (Lantier, Gregory) (Entered: 05/13/2011)
05/16/2011		Notice of Correction re 84 Exhibit List. −An incomplete document was filed. The filing user has been notified to refile the document with the **case number and caption**. (tche) (Entered: 05/16/2011)
05/16/2011	85	Exhibit List by Amdocs (Israel) Limited.. (Lantier, Gregory) (Entered: 05/16/2011)

05/20/2011	86	*Objections to Defendants'* Exhibit List by Amdocs (Israel) Limited.. (Lantier, Gregory) (Entered: 05/20/2011)
05/20/2011	87	*Objections to Plaintiff's* Exhibit List by Openet Telecom LTD., Openet Telecom, Inc... (Shin, Joseph) (Entered: 05/20/2011)
05/20/2011	88	*Objections to Plaintiff's Deposition Designations* Witness List by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 05/20/2011)
05/20/2011	89	*Plaintiff's Objections to Defendants' Deposition Designations* Witness List by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 05/20/2011)
05/23/2011		Notice of Correction re 89 Witness List, 86 Exhibit List, 87 Exhibit List, 88 Witness List. The filing users have been notified that the wrong event was selected for these docket entries. Witness List and Exhibit List were selected and Objection should have been selected. The filing user has been notified to file document 87 again, there is no case caption, signature, or certificate of service. (rban,) (Entered: 05/23/2011)
05/23/2011	90	Objection to 84 Exhibit List *by Amdocs* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 05/23/2011)
05/23/2011	91	Objection to 81 Witness List *and Amdocs' Deposition Designations* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 05/23/2011)
05/23/2011	92	Objection to 82 Exhibit List *of Openet Defendants* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 05/23/2011)
05/23/2011	93	Objection to 83 Witness List *with Deposition Designations of Openet Defendants* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 05/23/2011)
05/24/2011	94	ORDER GRANTING Pro hac vice application of Michelle Elizabeth Kanter; Filing fee $ 50, receipt number 14683021734. Signed by District Judge Liam O'Grady on 5/24/2011. (Attachments: # 1 Receipt)(tche) (Entered: 05/26/2011)
05/26/2011	95	MOTION for Summary Judgment *of Non−Infringement and Invalidity* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 05/26/2011)
05/26/2011	96	Memorandum in Support re 95 MOTION for Summary Judgment *of Non−Infringement and Invalidity* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D, # 5 Exhibit E, # 6 Exhibit F, # 7 Exhibit G, # 8 Exhibit H, # 9 Exhibit I)(Shin, Joseph) (Entered: 05/26/2011)
05/26/2011	97	AFFIDAVIT in Support re 95 MOTION for Summary Judgment *of Non−Infringement and Invalidity of Joseph Hogan* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 05/26/2011)
05/26/2011	98	MOTION for Partial Summary Judgment *and Proposed Claim Constructions* by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 05/26/2011)
05/26/2011	99	Memorandum in Support re 98 MOTION for Partial Summary Judgment *and Proposed Claim Constructions* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 05/26/2011)
05/26/2011	100	AFFIDAVIT in Support re 98 MOTION for Partial Summary Judgment *and Proposed Claim Constructions Declaration of Gregory H. Lantier in Support of Plaintiff Amdocs (Israel) Limited's Motion for Proposed Claim Constructions and Partial Summary Judgment of No Invalidity and No Inequitable Conduct* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D, # 5 Exhibit E, # 6 Exhibit F, # 7 Exhibit G, # 8 Exhibit H, # 9 Exhibit I, # 10 Exhibit J, # 11 Exhibit K, # 12 Exhibit L, # 13 Exhibit M, # 14 Exhibit N, # 15 Exhibit O, # 16 Exhibit P, # 17 Exhibit Q, # 18 Exhibit R, # 19 Exhibit S, # 20 Exhibit T, # 21 Exhibit U, # 22 Exhibit V, # 23 Exhibit W, # 24 Exhibit X, # 25 Exhibit Y, # 26 Exhibit Z)(Lantier, Gregory) (Entered: 05/26/2011)
05/26/2011	101	AFFIDAVIT in Support re 98 MOTION for Partial Summary Judgment *and Proposed Claim Constructions Declaration of Dr. Ellen W. Zegura* filed by

		Amdocs (Israel) Limited. (Attachments: # 1 Appendix A, # 2 Appendix B)(Lantier, Gregory) (Entered: 05/26/2011)
06/06/2011	102	NOTICE by Amdocs (Israel) Limited *of Withdrawal as Counsel of Laura Sheridan* (Lantier, Gregory) (Entered: 06/06/2011)
06/16/2011	103	Memorandum in Opposition re 95 MOTION for Summary Judgment *of Non−Infringement and Invalidity Amdocs' Opposition to Openet's Proposed Claim Constructions and Motion for Summary Judgment* filed by Amdocs (Israel) Limited. (Lantier, Gregory) **Under seal document received and placed in civil vault.** Modified on 6/16/2011 (tche). Modified text on 10/29/2013 Seal exhibits received on 6/16/2011 referred to document number 104(klau,). (Entered: 06/16/2011)
06/16/2011	104	AFFIDAVIT in Opposition re 95 MOTION for Summary Judgment *of Non−Infringement and Invalidity Declaration of Michelle E. Kanter in Support of Amdocs' Opposition to Openet's Proposed Clam Constructions and Motion for Summary Judgment of Non−Infringment and Invalidity* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit, # 2 Exhibit, # 3 Exhibit, # 4 Exhibit, # 5 Exhibit, # 6 Exhibit, # 7 Exhibit, # 8 Exhibit, # 9 Exhibit, # 10 Exhibit (Under Seal), # 11 Exhibit, # 12 Exhibit, # 13 Exhibit (Under Seal), # 14 Exhibit (Under Seal), # 15 Exhibit (Under Seal), # 16 Exhibit, # 17 Exhibit, # 18 Exhibit, # 19 Exhibit (Under Seal), # 20 Exhibit (Under Seal), # 21 Exhibit (Under Seal), # 22 Exhibit (Under Seal), # 23 Exhibit (Under Seal), # 24 Exhibit, # 25 Exhibit, # 26 Exhibit (Under Seal), # 27 Exhibit (Under Seal), # 28 Exhibit (Under Seal), # 29 Exhibit (Under Seal), # 30 Exhibit (Under Seal), # 31 Exhibit (Under Seal), # 32 Exhibit (Under Seal), # 33 Exhibit (Under Seal), # 34 Exhibit (Under Seal), # 35 Exhibit (Under Seal), # 36 Exhibit (Under Seal), # 37 Exhibit (Under Seal), # 38 Exhibit (Under Seal), # 39 Exhibit (Under Seal), # 40 Exhibit (Under Seal), # 41 Exhibit (Under Seal), # 42 Exhibit (Under Seal), # 43 Exhibit (Under Seal), # 44 Exhibit (Under Seal), # 45 Exhibit (Under Seal), # 46 Exhibit (Under Seal), # 47 Exhibit (Under Seal), # 48 Exhibit (Under Seal), # 49 Exhibit (Under Seal), # 50 Exhibit (Under Seal), # 51 Exhibit (Under Seal), # 52 Exhibit (Under Seal), # 53 Exhibit (Under Seal), # 54 Exhibit (Under Seal), # 55 Exhibit (Under Seal), # 56 Exhibit (Under Seal), # 57 Exhibit (Under Seal), # 58 Exhibit (Under Seal), # 59 Exhibit (Under Seal), # 60 Exhibit (Under Seal), # 61 Exhibit (Under Seal), # 62 Exhibit (Under Seal), # 63 Exhibit (Under Seal), # 64 Exhibit (Under Seal))(Lantier, Gregory) Modified on 10/29/2013 **Under Seal Exhibits received and placed in vault on 6/16/2011**(klau,). (Entered: 06/16/2011)
06/16/2011	105	MOTION to Seal *Plaintiff's Motion to File Opposition Brief and Selected Accompanying Exhibits Under Seal* by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/16/2011)
06/16/2011	106	Notice of Hearing Date re 105 MOTION to Seal *Plaintiff's Motion to File Opposition Brief and Selected Accompanying Exhibits Under Seal* (Lantier, Gregory) (Entered: 06/16/2011)
06/16/2011	107	Memorandum in Opposition re 98 MOTION for Partial Summary Judgment *and Proposed Claim Constructions* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D, # 5 Exhibit E, # 6 Exhibit F, # 7 Exhibit G, # 8 Exhibit H, # 9 Exhibit I, # 10 Exhibit J, # 11 Exhibit K, # 12 Exhibit L, # 13 Exhibit M, # 14 Exhibit N, # 15 Exhibit O, # 16 Exhibit P)(Shin, Joseph) (Entered: 06/16/2011)
06/16/2011	108	AFFIDAVIT in Opposition re 98 MOTION for Partial Summary Judgment *and Proposed Claim Constructions Declaration of Joseph Hogan* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A)(Shin, Joseph) (Entered: 06/16/2011)
06/16/2011	109	AFFIDAVIT in Opposition re 98 MOTION for Partial Summary Judgment *and Proposed Claim Constructions Declaration of Michael Shamos* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit 1)(Shin, Joseph) (Entered: 06/16/2011)
06/16/2011	110	AFFIDAVIT in Opposition re 98 MOTION for Partial Summary Judgment *and Proposed Claim Constructions Declaration of Patrick McDaniel* filed by Openet

		Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/16/2011)
06/17/2011		Set Deadlines as to 105 MOTION to Seal *Plaintiff's Motion to File Opposition Brief and Selected Accompanying Exhibits Under Seal*. Motion Hearing set for 7/8/2011 at 10:00 AM in Alexandria Courtroom 301 before Magistrate Judge Thomas Rawles Jones Jr. (clar,) (Entered: 06/17/2011)
06/17/2011		MOTIONS REFERRED to Magistrate Judge: Jones. 105 MOTION to Seal *Plaintiff's Motion to File Opposition Brief and Selected Accompanying Exhibits Under Seal* (clar,) (Entered: 06/17/2011)
06/21/2011	111	(REDACTED) Memorandum in Opposition re 95 MOTION for Summary Judgment *of Non−Infringement and Invalidity Amdocs' Opposition to Openet's Proposed Claim Constructions and Motion for Summary Judgment (Redacted)* filed by Amdocs (Israel) Limited. (Lantier, Gregory) Modified text on 10/29/2013 (klau,). (Entered: 06/21/2011)
06/24/2011	112	Consent MOTION for Stipulated Scheduling Order by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/24/2011)
06/27/2011	113	NOTICE by Openet Telecom LTD., Openet Telecom, Inc. *Section 282 Notice* (Attachments: # 1 Exhibit A)(Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	114	STIPULATED Scheduling Order. (See order for details). Signed by District Judge Leonie M. Brinkema on 6/27/2011. (tche) (Entered: 06/27/2011)
06/27/2011	115	MOTION in Limine *No. 1 to Preclude Argument or Evidence Regarding the Fact that Amdocs is Seeking an Injunction* by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	116	Memorandum in Support re 115 MOTION in Limine *No. 1 to Preclude Argument or Evidence Regarding the Fact that Amdocs is Seeking an Injunction* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	117	MOTION in Limine *No. 1 to Exclude Expert Testimony of Mark Hosfield* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	118	Memorandum in Support re 117 MOTION in Limine *No. 1 to Exclude Expert Testimony of Mark Hosfield (Filed Under Seal)* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B (Filed Under Seal), # 3 Exhibit C (Filed Under Seal))(Shin, Joseph) (Attachment 1 replaced on 7/7/2011) (tche,). (Entered: 06/27/2011)
06/27/2011	119	MOTION in Limine *No. 2 to Exclude Evidence of Pre−Complaint Damages* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	120	Memorandum in Support re 119 MOTION in Limine *No. 2 to Exclude Evidence of Pre−Complaint Damages (Filed Under Seal)* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B (Filed Under Seal), # 3 Exhibit C (Filed Under Seal), # 4 Exhibit D)(Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	121	MOTION in Limine *No. 3 to Preclude Evidence or Argument Concerning Foreign Installations and Functionalities* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	122	Memorandum in Support re 121 MOTION in Limine *No. 3 to Preclude Evidence or Argument Concerning Foreign Installations and Functionalities* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C)(Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	123	AFFIDAVIT in Support re 121 MOTION in Limine *No. 3 to Preclude Evidence or Argument Concerning Foreign Installations and Functionalities by Joseph Hogan* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)

06/27/2011	124	MOTION in Limine *No. 4 to Exclude Certain Expert Testimony of Ellen Zegura* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	125	Memorandum in Support re 124 MOTION in Limine *No. 4 to Exclude Certain Expert Testimony of Ellen Zegura* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B)(Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	126	MOTION in Limine *No. 5 to Strike Portions of the Supplemental Expert Report of Dr. Ellen Zegura* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	127	Memorandum in Support re 126 MOTION in Limine *No. 5 to Strike Portions of the Supplemental Expert Report of Dr. Ellen Zegura* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C)(Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	128	MOTION in Limine *No. 6 to Exclude Evidence of Willful Patent Infringement* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	129	Memorandum in Support re 128 MOTION in Limine *No. 6 to Exclude Evidence of Willful Patent Infringement* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B)(Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	130	MOTION in Limine *for Relief for Plaintiff's Spoliation of Evidence* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	131	Memorandum in Support re 130 MOTION in Limine *for Relief for Plaintiff's Spoliation of Evidence* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B (Filed Under Seal), # 3 Exhibit C (Filed Under Seal), # 4 Exhibit D, # 5 Exhibit E, # 6 Exhibit F, # 7 Exhibit G, # 8 Exhibit H (Filed Under Seal), # 9 Exhibit I)(Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	132	MOTION in Limine *No. 8 to Preclude Unsubstantiated and Irrelevant Testimony in Support of Secondary Considerations of Obviousness* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	133	Memorandum in Support re 132 MOTION in Limine *No. 8 to Preclude Unsubstantiated and Irrelevant Testimony in Support of Secondary Considerations of Obviousness (Filed Under Seal)* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C (Filed Under Seal), # 4 Exhibit D, # 5 Exhibit E)(Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	134	MOTION in Limine *No. 9 to Exclude Evidence and Argument Regarding Judicial Treatment of Experts in Prior Cases* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	135	Memorandum in Support re 134 MOTION in Limine *No. 9 to Exclude Evidence and Argument Regarding Judicial Treatment of Experts in Prior Cases* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	136	MOTION in Limine *No. 10 to Exclude Evidence Regarding Irrelevant and Prejudicial Entertainment Expenses* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	137	Memorandum in Support re 136 MOTION in Limine *No. 10 to Exclude Evidence Regarding Irrelevant and Prejudicial Entertainment Expenses (Filed Under Seal)* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A (Filed Under Seal), # 2 Exhibit B (Filed Under Seal))(Shin, Joseph) (Entered: 06/27/2011)
06/27/2011	138	MOTION to Seal *Memorandum in Support of Openet's Motions in Limine Nos. 1, 2, 7, 8, and 10* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/27/2011)

06/27/2011	139	MOTION in Limine *No. 2 to Preclude Argument or Evidence Before the Jury Regarding Amdocs' Relative or Absolute Size and Revenues* by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	140	Memorandum in Support re 139 MOTION in Limine *No. 2 to Preclude Argument or Evidence Before the Jury Regarding Amdocs' Relative or Absolute Size and Revenues* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	141	MOTION in Limine *No. 3 to Preclude Argument or Evidence Regarding Amdocs' Supposed Reasons or Motivation to Bring Suit* by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	142	Memorandum in Support re 141 MOTION in Limine *No. 3 to Preclude Argument or Evidence Regarding Amdocs' Supposed Reasons or Motivation to Bring Suit* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	143	MOTION in Limine *No. 4 to Preclude Argument or Evidence Before the Jury Regarding Openet's Inequitable Conduct Claims* by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	144	Memorandum in Support re 143 MOTION in Limine *No. 4 to Preclude Argument or Evidence Before the Jury Regarding Openet's Inequitable Conduct Claims* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	145	MOTION in Limine *No. 5 to Preclude Argument or Evidence Regarding Art References Other Than Those Openet Identified Pursuant to the Parties' Agreement* by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	146	Memorandum in Support re 145 MOTION in Limine *No. 5 to Preclude Argument or Evidence Regarding Art References Other Than Those Openet Identified Pursuant to the Parties' Agreement* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	147	MOTION in Limine *No. 6 to Preclude Openet's Expert, Dr. Michael I. Shamos, From Offering Opinions Not Included in His Expert Reports* by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	148	Memorandum in Support re 147 MOTION in Limine *No. 6 to Preclude Openet's Expert, Dr. Michael I. Shamos, From Offering Opinions Not Included in His Expert Reports* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	149	AFFIDAVIT in Support re 145 MOTION in Limine *No. 5 to Preclude Argument or Evidence Regarding Art References Other Than Those Openet Identified Pursuant to the Parties' Agreement,* 147 MOTION in Limine *No. 6 to Preclude Openet's Expert, Dr. Michael I. Shamos, From Offering Opinions Not Included in His Expert Reports Declaration of Michelle E. Kanter in Support of Plaintiff Amdocs (Israel) Limited's Motions in Limine Nos. 5−6* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D, # 5 Exhibit E)(Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	150	Notice of Hearing Date re 145 MOTION in Limine *No. 5 to Preclude Argument or Evidence Regarding Art References Other Than Those Openet Identified Pursuant to the Parties' Agreement,* 143 MOTION in Limine *No. 4 to Preclude Argument or Evidence Before the Jury Regarding Openet's Inequitable Conduct Claims,* 139 MOTION in Limine *No. 2 to Preclude Argument or Evidence Before the Jury Regarding Amdocs' Relative or Absolute Size and Revenues,* 147 MOTION in Limine *No. 6 to Preclude Openet's Expert, Dr. Michael I. Shamos, From Offering Opinions Not Included in His Expert Reports,* 141 MOTION in Limine *No. 3 to Preclude Argument or Evidence Regarding Amdocs' Supposed Reasons or Motivation to Bring Suit,* 115 MOTION in Limine *No. 1 to Preclude Argument or Evidence Regarding the Fact that Amdocs is Seeking an Injunction* (Lantier, Gregory) (Entered: 06/27/2011)
06/27/2011	213	Sealed Version of 133 Memorandum in Support. (Attachments: # 1 Exhibit C (Under Seal))(tche) (Entered: 07/07/2011)

06/27/2011	214	Sealed Version of 137 Memorandum in Support. (Attachments: # 1 Exhibit A, # 2 Exhibit B)(tche) (Entered: 07/07/2011)
06/27/2011	215	Sealed Version of 157 Memorandum in Support. (Attachments: # 1 Exhibit B (Under Seal), # 2 Exhibit C (Under Seal))(tche) (Entered: 07/07/2011)
06/27/2011	217	Sealed Version of 131 Memorandum in Support. (Attachments: # 1 Exhibit B (Under Seal), # 2 Exhibit C (Under Seal), # 3 Exhibit H (Under Seal))(tche) (Entered: 07/07/2011)
06/27/2011	218	Sealed Version of 118 Memorandum in Support. (Attachments: # 1 Exhibit B (Under Seal), # 2 Exhibit C (Under Seal))(tche) (Additional attachment(s) added on 7/7/2011: # 3 Exhibit A (Under Seal)) (tche,). (Entered: 07/07/2011)
06/28/2011	151	MOTION in Limine *No. 3 to Preclude Evidence or Argument Concerning Foreign Installations and Functionalities* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/28/2011)
06/28/2011	152	Memorandum in Support re 151 MOTION in Limine *No. 3 to Preclude Evidence or Argument Concerning Foreign Installations and Functionalities* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Errata C)(Shin, Joseph) (Entered: 06/28/2011)
06/28/2011	153	AFFIDAVIT in Support re 151 MOTION in Limine *No. 3 to Preclude Evidence or Argument Concerning Foreign Installations and Functionalities by Joseph Hogan* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/28/2011)
06/28/2011		Set Deadlines as to 141 MOTION in Limine *No. 3 to Preclude Argument or Evidence Regarding Amdocs' Supposed Reasons or Motivation to Bring Suit,* 139 MOTION in Limine *No. 2 to Preclude Argument or Evidence Before the Jury Regarding Amdocs' Relative or Absolute Size and Revenues,* 145 MOTION in Limine *No. 5 to Preclude Argument or Evidence Regarding Art References Other Than Those Openet Identified Pursuant to the Parties' Agreement,* 143 MOTION in Limine *No. 4 to Preclude Argument or Evidence Before the Jury Regarding Openet's Inequitable Conduct Claims,* 147 MOTION in Limine *No. 6 to Preclude Openet's Expert, Dr. Michael I. Shamos, From Offering Opinions Not Included in His Expert Reports*. Motion Hearing set for 7/8/2011 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (clar,) (Entered: 06/28/2011)
06/28/2011	154	Notice of Hearing Date set for 07/08/2011 re 119 MOTION in Limine *No. 2 to Exclude Evidence of Pre−Complaint Damages,* 134 MOTION in Limine *No. 9 to Exclude Evidence and Argument Regarding Judicial Treatment of Experts in Prior Cases,* 128 MOTION in Limine *No. 6 to Exclude Evidence of Willful Patent Infringement,* 136 MOTION in Limine *No. 10 to Exclude Evidence Regarding Irrelevant and Prejudicial Entertainment Expenses,* 130 MOTION in Limine *for Relief for Plaintiff's Spoliation of Evidence,* 124 MOTION in Limine *No. 4 to Exclude Certain Expert Testimony of Ellen Zegura,* 126 MOTION in Limine *No. 5 to Strike Portions of the Supplemental Expert Report of Dr. Ellen Zegura,* 132 MOTION in Limine *No. 8 to Preclude Unsubstantiated and Irrelevant Testimony in Support of Secondary Considerations of Obviousness,* 121 MOTION in Limine *No. 3 to Preclude Evidence or Argument Concerning Foreign Installations and Functionalities,* 117 MOTION in Limine *No. 1 to Exclude Expert Testimony of Mark Hosfield* (Shin, Joseph) (Entered: 06/28/2011)
06/28/2011	155	ORDERED that within two days of this Order, defendants publicly file all briefs and exhibits in support of their Motions in Limine Nos. 1, 2, 7, 8, and 10, unless they can show good reasons for maintaining specific information under seal. That a party may have designated material as confidential during the discovery process is not a sufficient basis for sealing that material. Moreover, the Court will impose monetary sanctions on any counsel in this civil action who files any pleading or exhibit under seal without good cause. Signed by District Judge Leonie M. Brinkema on 6/28/2011. (tche) (Entered: 06/29/2011)
06/29/2011		Set Deadlines as to 134 MOTION in Limine *No. 9 to Exclude Evidence and Argument Regarding Judicial Treatment of Experts in Prior Cases,* 121 MOTION in Limine *No. 3 to Preclude Evidence or Argument Concerning Foreign*

		Installations and Functionalities, 124 MOTION in Limine *No. 4 to Exclude Certain Expert Testimony of Ellen Zegura,* 126 MOTION in Limine *No. 5 to Strike Portions of the Supplemental Expert Report of Dr. Ellen Zegura,* 119 MOTION in Limine *No. 2 to Exclude Evidence of Pre−Complaint Damages,* 136 MOTION in Limine *No. 10 to Exclude Evidence Regarding Irrelevant and Prejudicial Entertainment Expenses,* 130 MOTION in Limine *for Relief for Plaintiff's Spoliation of Evidence,* 132 MOTION in Limine *No. 8 to Preclude Unsubstantiated and Irrelevant Testimony in Support of Secondary Considerations of Obviousness,* 128 MOTION in Limine *No. 6 to Exclude Evidence of Willful Patent Infringement,* 117 MOTION in Limine *No. 1 to Exclude Expert Testimony of Mark Hosfield.* Motion Hearing set for 7/8/2011 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (clar,) (Entered: 06/29/2011)
06/30/2011	156	Memorandum in Support re 117 MOTION in Limine *No. 1 to Exclude Expert Testimony of Mark Hosfield* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A (Redacted), # 2 Exhibit B, # 3 Exhibit C)(Shin, Joseph) (Entered: 06/30/2011)
06/30/2011	157	Memorandum in Support re 119 MOTION in Limine *No. 2 to Exclude Evidence of Pre−Complaint Damages (Redacted)* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D)(Shin, Joseph) (Entered: 06/30/2011)
06/30/2011	158	Memorandum in Support re 130 MOTION in Limine *for Relief for Plaintiff's Spoliation of Evidence* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D, # 5 Exhibit E, # 6 Exhibit F, # 7 Exhibit G, # 8 Exhibit H, # 9 Exhibit I)(Shin, Joseph) (Entered: 06/30/2011)
06/30/2011	159	Memorandum in Support re 132 MOTION in Limine *No. 8 to Preclude Unsubstantiated and Irrelevant Testimony in Support of Secondary Considerations of Obviousness (Redacted)* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C (Filed Under Seal), # 4 Exhibit D, # 5 Exhibit E)(Shin, Joseph) (Entered: 06/30/2011)
06/30/2011	160	Memorandum in Support re 136 MOTION in Limine *No. 10 to Exclude Evidence Regarding Irrelevant and Prejudicial Entertainment Expenses (Redacted)* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A (Redacted), # 2 Exhibit B (Redacted))(Shin, Joseph) (Entered: 06/30/2011)
06/30/2011	161	MOTION to Seal *For Good Cause* by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit 1, # 2 Exhibit 2)(Shin, Joseph) (Entered: 06/30/2011)
06/30/2011	162	Reply to 111 Memorandum in Opposition, *to Openet's Motion for Summary Judgment* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D, # 5 Exhibit E, # 6 Exhibit F, # 7 Exhibit G, # 8 Exhibit H, # 9 Exhibit I, # 10 Exhibit J, # 11 Exhibit K, # 12 Exhibit L, # 13 Exhibit M, # 14 Exhibit N, # 15 Exhibit O)(Shin, Joseph) (Entered: 06/30/2011)
06/30/2011	163	AFFIDAVIT re 162 Reply, *to Memorandum in Opposition to Openet's Motion for Summary Judgment* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/30/2011)
06/30/2011	164	MOTION to Strike *Exhibits 8−10 to Amdocs' Opposition to Openet's Motion for Summary Judgment* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/30/2011)
06/30/2011	165	Memorandum in Support re 164 MOTION to Strike *Exhibits 8−10 to Amdocs' Opposition to Openet's Motion for Summary Judgment* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 06/30/2011)
06/30/2011	166	REPLY to Response to Motion re 98 MOTION for Partial Summary Judgment *and Proposed Claim Constructions Reply Memorandum in Further Support of Amdocs (Israel) Limited's Motion for Proposed Claim Constructions and Partial Summary*

		Judgment of No Invalidity and No Inequitable Conduct filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 06/30/2011)
06/30/2011	167	AFFIDAVIT in Support re 98 MOTION for Partial Summary Judgment *and Proposed Claim Constructions Declaration of Michelle E. Kanter in Support of the Reply Memorandum in Further Support of Amdocs (Israel) Limited's Motion for Proposed Claim Constuctions and Partial Summary Judgment of No Invalidity and No Inequitable Conduct* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit, # 2 Exhibit, # 3 Exhibit, # 4 Exhibit, # 5 Exhibit)(Lantier, Gregory) (Entered: 06/30/2011)
07/01/2011	168	Memorandum in Support re 117 MOTION in Limine *No. 1 to Exclude Expert Testimony of Mark Hosfield (Corrected)* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A (Redacted), # 2 Exhibit B, # 3 Exhibit C)(Shin, Joseph) (Entered: 07/01/2011)
07/01/2011	169	Notice of Hearing Date re 164 MOTION to Strike *Exhibits 8−10 to Amdocs' Opposition to Openet's Motion for Summary Judgment* (Shin, Joseph) (Entered: 07/01/2011)
07/01/2011	170	Memorandum in Opposition re 117 MOTION in Limine *No. 1 to Exclude Expert Testimony of Mark Hosfield Amdocs' Opposition to Openet's Motion In Limine to Exclude Expert Testimony of Mark Hosfield (Redacted)* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit, # 2 Exhibit, # 3 Exhibit, # 4 Exhibit, # 5 Exhibit (Redacted), # 6 Exhibit)(Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	171	MOTION to Seal *Plaintiff Amdocs' Motion for Leave to File Opposition Brief and One Exhibit Under Seal With Redacted Public Versions* by Amdocs (Israel) Limited. (Attachments: # 1 Proposed Order)(Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	172	Memorandum in Support re 171 MOTION to Seal *Plaintiff Amdocs' Motion for Leave to File Opposition Brief and One Exhibit Under Seal With Redacted Public Versions* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	173	Memorandum in Opposition re 119 MOTION in Limine *No. 2 to Exclude Evidence of Pre−Complaint Damages Amdocs' Opposition to Openet's Motion in Limine No. 2 to Exclude Evidence of Pre−Complaint Damages* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	174	Memorandum in Opposition re 151 MOTION in Limine *No. 3 to Preclude Evidence or Argument Concerning Foreign Installations and Functionalities,* 121 MOTION in Limine *No. 3 to Preclude Evidence or Argument Concerning Foreign Installations and Functionalities* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit, # 2 Exhibit)(Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	175	Memorandum in Opposition re 124 MOTION in Limine *No. 4 to Exclude Certain Expert Testimony of Ellen Zegura* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit, # 2 Exhibit)(Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	176	Memorandum in Opposition re 126 MOTION in Limine *No. 5 to Strike Portions of the Supplemental Expert Report of Dr. Ellen Zegura* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit, # 2 Exhibit)(Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	177	Opposition to 115 MOTION in Limine *No. 1 to Preclude Argument or Evidence Regarding the Fact that Amdocs is Seeking an Injunction* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 07/01/2011)
07/01/2011	178	Memorandum in Opposition re 139 MOTION in Limine *No. 2 to Preclude Argument or Evidence Before the Jury Regarding Amdocs' Relative or Absolute Size and Revenues* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B)(Shin, Joseph) (Entered: 07/01/2011)
07/01/2011	179	Memorandum in Opposition re 141 MOTION in Limine *No. 3 to Preclude Argument or Evidence Regarding Amdocs' Supposed Reasons or Motivation to Bring Suit* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: #

		1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C)(Shin, Joseph) (Entered: 07/01/2011)
07/01/2011	180	Memorandum in Opposition re 143 MOTION in Limine *No. 4 to Preclude Argument or Evidence Before the Jury Regarding Openet's Inequitable Conduct Claims* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 07/01/2011)
07/01/2011	181	Memorandum in Opposition re 145 MOTION in Limine *No. 5 to Preclude Argument or Evidence Regarding Art References Other Than Those Openet Identified Pursuant to the Parties' Agreement* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 07/01/2011)
07/01/2011	182	Memorandum in Opposition re 147 MOTION in Limine *No. 6 to Preclude Openet's Expert, Dr. Michael I. Shamos, From Offering Opinions Not Included in His Expert Reports* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B)(Shin, Joseph) (Entered: 07/01/2011)
07/01/2011	183	Memorandum in Opposition re 128 MOTION in Limine *No. 6 to Exclude Evidence of Willful Patent Infringement* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit, # 2 Exhibit, # 3 Exhibit, # 4 Exhibit, # 5 Exhibit)(Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	184	Memorandum in Opposition re 130 MOTION in Limine *for Relief for Plaintiff's Spoliation of Evidence* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit)(Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	185	Memorandum in Opposition re 132 MOTION in Limine *No. 8 to Preclude Unsubstantiated and Irrelevant Testimony in Support of Secondary Considerations of Obviousness Amdocs' Opposition to Openet's Motion In Limine No. 8 to Preclude Testimony in Support of Secondary Considerations of Non−obviousness* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	186	Memorandum in Opposition re 134 MOTION in Limine *No. 9 to Exclude Evidence and Argument Regarding Judicial Treatment of Experts in Prior Cases* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	187	Memorandum in Opposition re 136 MOTION in Limine *No. 10 to Exclude Evidence Regarding Irrelevant and Prejudicial Entertainment Expenses Amdocs' Opposition to Openet's Motion In Limine No. 10 to Exclude Evidence of Openet Employee's Entertainment Expenses* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	188	Notice of Hearing Date re 171 MOTION to Seal *Plaintiff Amdocs' Motion for Leave to File Opposition Brief and One Exhibit Under Seal With Redacted Public Versions* (Lantier, Gregory) (Entered: 07/01/2011)
07/01/2011	216	Sealed Version of 170 Memorandum in Opposition. (Attachments: # 1 Exhibit B (Under Seal))(tche) (Entered: 07/07/2011)
07/05/2011		Set Deadlines as to 164 MOTION to Strike *Exhibits 8−10 to Amdocs' Opposition to Openet's Motion for Summary Judgment*, 171 MOTION to Seal *Plaintiff Amdocs' Motion for Leave to File Opposition Brief and One Exhibit Under Seal With Redacted Public Versions*. Motion Hearing set for 7/8/2011 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (clar,) (Entered: 07/05/2011)
07/05/2011	189	Reply to 117 MOTION in Limine *No. 1 to Exclude Expert Testimony of Mark Hosfield* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 07/05/2011)
07/05/2011	190	Reply to 119 MOTION in Limine *No. 2 to Exclude Evidence of Pre−Complaint Damages* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 07/05/2011)
07/05/2011	191	Reply to 151 MOTION in Limine *No. 3 to Preclude Evidence or Argument Concerning Foreign Installations and Functionalities* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 07/05/2011)

07/05/2011	192	Reply to 124 MOTION in Limine *No. 4 to Exclude Certain Expert Testimony of Ellen Zegura* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A)(Shin, Joseph) (Entered: 07/05/2011)
07/05/2011	193	Reply to 126 MOTION in Limine *No. 5 to Strike Portions of the Supplemental Expert Report of Dr. Ellen Zegura* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 07/05/2011)
07/05/2011	194	Reply to 128 MOTION in Limine *No. 6 to Exclude Evidence of Willful Patent Infringement* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A)(Shin, Joseph) (Entered: 07/05/2011)
07/05/2011	195	Reply to 130 MOTION in Limine *for Relief for Plaintiff's Spoliation of Evidence* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Exhibit C, # 4 Exhibit D)(Shin, Joseph) (Entered: 07/05/2011)
07/05/2011	196	Reply to 132 MOTION in Limine *No. 8 to Preclude Unsubstantiated and Irrelevant Testimony in Support of Secondary Considerations of Obviousness (Redacted Public Version)* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 07/05/2011)
07/05/2011	197	Reply to 134 MOTION in Limine *No. 9 to Exclude Evidence and Argument Regarding Judicial Treatment of Experts in Prior Cases* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 07/05/2011)
07/05/2011	198	Reply to 136 MOTION in Limine *No. 10 to Exclude Evidence Regarding Irrelevant and Prejudicial Entertainment Expenses* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 07/05/2011)
07/05/2011	199	MOTION to Seal *Reply Brief in Support of Openet's Motion in Limine No. 8 for Good Cause* by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 07/05/2011)
07/05/2011	200	Memorandum in Support re 199 MOTION to Seal *Reply Brief in Support of Openet's Motion in Limine No. 8 for Good Cause* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Proposed Order)(Shin, Joseph) (Entered: 07/05/2011)
07/05/2011	201	Notice of Hearing Date set for 7/8/2011 re 199 MOTION to Seal *Reply Brief in Support of Openet's Motion in Limine No. 8 for Good Cause* (Shin, Joseph) (Entered: 07/05/2011)
07/05/2011	202	REPLY to Response to Motion re 115 MOTION in Limine *No. 1 to Preclude Argument or Evidence Regarding the Fact that Amdocs is Seeking an Injunction* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit)(Lantier, Gregory) (Entered: 07/05/2011)
07/05/2011	203	REPLY to Response to Motion re 139 MOTION in Limine *No. 2 to Preclude Argument or Evidence Before the Jury Regarding Amdocs' Relative or Absolute Size and Revenues* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit)(Lantier, Gregory) (Entered: 07/05/2011)
07/05/2011	204	REPLY to Response to Motion re 141 MOTION in Limine *No. 3 to Preclude Argument or Evidence Regarding Amdocs' Supposed Reasons or Motivation to Bring Suit* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit, # 2 Exhibit)(Lantier, Gregory) (Entered: 07/05/2011)
07/05/2011	205	REPLY to Response to Motion re 143 MOTION in Limine *No. 4 to Preclude Argument or Evidence Before the Jury Regarding Openet's Inequitable Conduct Claims* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 07/05/2011)
07/05/2011	206	REPLY to Response to Motion re 145 MOTION in Limine *No. 5 to Preclude Argument or Evidence Regarding Art References Other Than Those Openet Identified Pursuant to the Parties' Agreement* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit)(Lantier, Gregory) (Entered: 07/05/2011)
07/05/2011	207	REPLY to Response to Motion re 147 MOTION in Limine *No. 6 to Preclude Openet's Expert, Dr. Michael I. Shamos, From Offering Opinions Not Included in*

		His Expert Reports filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit, # 2 Exhibit, # 3 Exhibit)(Lantier, Gregory) (Entered: 07/05/2011)
07/05/2011	210	Sealed Document. Unredacted version of 196 Reply. (tche) (Entered: 07/06/2011)
07/06/2011		Set Deadlines as to 199 MOTION to Seal *Reply Brief in Support of Openet's Motion in Limine No. 8 for Good Cause*. Motion Hearing set for 7/8/2011 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (clar,) (Entered: 07/06/2011)
07/06/2011	208	SO ORDERED re 171 Motion for Leave to File Opposition Brief and One Exhibit Under Seal with Redacted Public Versions. Signed by District Judge Leonie M. Brinkema on 7/6/2011. (tche) (Entered: 07/06/2011)
07/06/2011	209	SO ORDERED re 199 Openet's Motion to for Leave to File Under Seal for Good Cause. Signed by District Judge Leonie M. Brinkema on 7/6/2011. (tche) (Entered: 07/06/2011)
07/06/2011	211	Memorandum in Opposition re 164 MOTION to Strike *Exhibits 8−10 to Amdocs' Opposition to Openet's Motion for Summary Judgment* filed by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 07/06/2011)
07/07/2011		Reset Deadlines as to 105 MOTION to Seal *Plaintiff's Motion to File Opposition Brief and Selected Accompanying Exhibits Under Seal*. Motion Hearing set for 7/8/2011 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (clar,) (Entered: 07/07/2011)
07/07/2011	212	MOTION to Amend/Correct by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Proposed Order, # 2 157, # 3 159, # 4 160−1, # 5 168−1, # 6 196)(Shin, Joseph) (Entered: 07/07/2011)
07/07/2011	219	ORDER granting 161 Motion to Seal. Defendants' Motion for Leave to File Under Seal for Good Cause [Dkt. No. 161] is GRANTED, and it is hereby ORDERED that defendants' unredacted memoranda supporting Motions in Limine No. 2, No. 8, and No. 10, as well as Exhibits A and B to the memorandum supporting Motion in Limine No. 10 and Exhibit C to the memorandum supporting Motion in Limine No. 8 be filed under seal, and it is further ORDERED that Exhibit A to the defendants' memorandum supporting their Motion in Limine No. 1 [Dkt. No. 118 , Attachment 1] be restricted as a sealed document. Signed by District Judge Leonie M. Brinkema on 7/7/2011. (tche) (Entered: 07/07/2011)
07/07/2011	220	Reply to 211 Memorandum in Opposition *to Openet's Motion to Strike* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A)(Shin, Joseph) (Entered: 07/07/2011)
07/07/2011	221	Amended MOTION to Seal *re Dkt. No. 105 − Amdocs' Amended Motion to File Opposition Brief and Selected Accompanying Exhibits Under Seal* by Amdocs (Israel) Limited. (Attachments: # 1 Proposed Order)(Lantier, Gregory) (Entered: 07/07/2011)
07/07/2011	222	Memorandum in Support re 221 Amended MOTION to Seal *re Dkt. No. 105 − Amdocs' Amended Motion to File Opposition Brief and Selected Accompanying Exhibits Under Seal* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit A)(Lantier, Gregory) (Entered: 07/07/2011)
07/07/2011	223	Notice of Hearing Date re 221 Amended MOTION to Seal *re Dkt. No. 105 − Amdocs' Amended Motion to File Opposition Brief and Selected Accompanying Exhibits Under Seal* (Lantier, Gregory) (Entered: 07/07/2011)
07/07/2011	226	ORDER GRANTING Pro hac vice application of Joshua Marc Salzman; Filing fee $ 50, receipt number 14683022730. Signed by District Judge Leonie M. Brinkema on 7/7/2011. (Attachments: # 1 Receipt)(tche) (Entered: 07/08/2011)
07/08/2011	224	NOTICE by Amdocs (Israel) Limited re 103 Memorandum in Opposition, 104 Affidavit in Opposition to Motion,,,,,, *Notice of Submission of Documents for Public Filing (Redacted Opposition Memorandum and Exhibits)* (Attachments: # 1 Amdocs' Opposition to Openet's Proposed Claim Constructions and Motion for Summary Judgment of Non−Infringement and Invalidity, # 2 Exhibit 1, # 3 Exhibit

		2, # 4 Exhibit 3, # 5 Exhibit 4, # 6 Exhibit 5, # 7 Exhibit 6, # 8 Exhibit 7, # 9 Exhibit 8, # 10 Exhibit 9, # 11 Exhibit 10 (Redacted), # 12 Exhibit 11, # 13 Exhibit 12, # 14 Exhibit 13, # 15 Exhibit 14, # 16 Exhibit 15, # 17 Exhibit 16, # 18 Exhibit 17, # 19 Exhibit 18, # 20 Exhibit 19, # 21 Exhibit 20 (Under Seal), # 22 Exhibit 21 (Under Seal), # 23 Exhibit 22 (Under Seal), # 24 Exhibit 23, # 25 Exhibit 24, # 26 Exhibit 25, # 27 Exhibit 26 (Under Seal), # 28 Exhibit 27, # 29 Exhibit 28, # 30 Exhibit 29 (Under Seal), # 31 Exhibit 30 (Under Seal), # 32 Exhibit 31 (Under Seal), # 33 Exhibit 32 (Under Seal), # 34 Exhibit 33 (Under Seal), # 35 Exhibit 34 (Under Seal), # 36 Exhibit 35, # 37 Exhibit 36 (Under Seal), # 38 Exhibit 37 (Under Seal), # 39 Exhibit 38 (Under Seal), # 40 Exhibit 39 (Under Seal), # 41 Exhibit 40, # 42 Exhibit 41 (Under Seal), # 43 Exhibit 42 (Under Seal), # 44 Exhibit 43 (Under Seal), # 45 Exhibit 44 (Under Seal), # 46 Exhibit 45, # 47 Exhibit 46 (Under Seal), # 48 Exhibit 47 (Under Seal), # 49 Exhibit 48 (Under Seal), # 50 Exhibit 49 (Under Seal), # 51 Exhibit 50 (Under Seal), # 52 Exhibit 51 (Under Seal), # 53 Exhibit 52 (Under Seal), # 54 Exhibit 53 (Under Seal), # 55 Exhibit 54 (Under Seal), # 56 Exhibit 55 (Under Seal), # 57 Exhibit 56 (Under Seal), # 58 Exhibit 57 (Under Seal), # 59 Exhibit 58 (Under Seal), # 60 Exhibit 59 (Under Seal), # 61 Exhibit 60 (Under Seal), # 62 Exhibit 61 (Under Seal), # 63 Exhibit 62 (Under Seal), # 64 Exhibit 63, # 65 Exhibit 64)(Lantier, Gregory) (Entered: 07/08/2011)
07/08/2011	225	Minute Entry for proceedings held before District Judge Leonie M. Brinkema: Motion Hearing held on 7/8/2011. Appearance of counsel. Pltf's 145 MOTION in Limine *No. 5 to Preclude Argument or Evidence Regarding Art References Other Than Those Openet Identified Pursuant to the Parties' Agreement, defts' 151 MOTION in Limine No. 3 to Preclude Evidence or Argument Concerning Foreign Installations and Functionalities, 212 MOTION to Amend/Correct, 119 MOTION in Limine No. 2 to Exclude Evidence of Pre−Complaint Damages, pltf's 143 MOTION in Limine No. 4 to Preclude Argument or Evidence Before the Jury Regarding Openet's Inequitable Conduct Claims, defts' 134 MOTION in Limine No. 9 to Exclude Evidence and Argument Regarding Judicial Treatment of Experts in Prior Cases, 139 MOTION in Limine No. 2 to Preclude Argument or Evidence Before the Jury Regarding Amdocs' Relative or Absolute Size and Revenues, defts' 128 MOTION in Limine No. 6 to Exclude Evidence of Willful Patent Infringement, 136 MOTION in Limine No. 10 to Exclude Evidence Regarding Irrelevant and Prejudicial Entertainment Expenses, 130 MOTION in Limine for Relief for Plaintiff's Spoliation of Evidence, 124 MOTION in Limine No. 4 to Exclude Certain Expert Testimony of Ellen Zegura, 126 MOTION in Limine No. 5 to Strike Portions of the Supplemental Expert Report of Dr. Ellen Zegura, pltf's 147 MOTION in Limine No. 6 to Preclude Openet's Expert, Dr. Michael I. Shamos, From Offering Opinions Not Included in His Expert Reports, 141 MOTION in Limine No. 3 to Preclude Argument or Evidence Regarding Amdocs' Supposed Reasons or Motivation to Bring Suit, pltf's 164 MOTION to Strike Exhibits 8−10 to Amdocs' Opposition to Openet's Motion for Summary Judgment, deft's 221 Amended MOTION to Seal re Dkt. No. 105 − Amdocs' Amended Motion to File Opposition Brief and Selected Accompanying Exhibits Under Seal, 115 MOTION in Limine No. 1 to Preclude Argument or Evidence Regarding the Fact that Amdocs is Seeking an Injunction, pltfs' 132 MOTION in Limine No. 8 to Preclude Unsubstantiated and Irrelevant Testimony in Support of Secondary Considerations of Obviousness, defts' 121 MOTION in Limine No. 3 to Preclude Evidence or Argument Concerning Foreign Installations and Functionalities, 117 MOTION in Limine No. 1 to Exclude Expert Testimony of Mark Hosfield are HELD IN ABEYANCE. (Court Reporter Roberta Kerns/Rudiger &Green.) (yguy) (Entered: 07/08/2011)*
07/08/2011	227	MOTION for Leave to File *Douments [Refiled as Per Court Instructions]* by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Proposed Order, # 2 96−6, # 3 96−8, # 4 96−9, # 5 162−6, # 6 162−8)(Shin, Joseph) (Entered: 07/08/2011)
07/08/2011	228	ORDER granting 227 Motion for Leave to File. The motion is granted and enlarged versions of docket entry nos. 96−6,96−8,96−9,162−6, and 162−8 should be refiled. Signed by District Judge Leonie M. Brinkema on 7/8/2011. (tche) (Entered: 07/11/2011)

07/11/2011		Set Hearings: Settlement Conference set for 7/19/2011 at 11:00 AM in Alexandria Courtroom 301 before Magistrate Judge Thomas Rawles Jones Jr. (cmar,) (Entered: 07/11/2011)
07/11/2011	229	NOTICE by Openet Telecom LTD., Openet Telecom, Inc. re 228 Order on Motion for Leave to File *[Notice of Refiling Pursuant to Order]* (Attachments: # 1 Exhibit F to Openet's Memorandum in Support of Motion for Summary Judgment (Dkt. No. 96−6), # 2 Exhibit H to Openet's Memorandum in Support of Motion for Summary Judgment (Dkt. No. 96−8), # 3 Exhibit I to Openet's Memorandum in Support of Motion for Summary Judgment (Dkt. No. 96−9), # 4 Exhibit F to Reply to Amdocs' Opposition to Openet's Motion for Summary Judgment (Dkt. No. 162−6), # 5 Exhibit H to Reply to Amdocs' Opposition to Openet's Motion for Summary Judgment (Dkt. No. 162−8))(Shin, Joseph) (Entered: 07/11/2011)
07/11/2011	230	TRANSCRIPT of proceedings held on 7/8/2011 before Judge T.S. Ellis, III. Transcript may be viewed at the court public terminal or purchased through the Court Reporter/Transcriber before the deadline for Release of Transcript Restriction. After that date it may be obtained through PACER. Transcript prepared by Rudiger, Green &Kerns Reporting Service 703−591−3136. Redaction Request due 8/10/2011. Redacted Transcript Deadline set for 9/12/2011. Release of Transcript Restriction set for 10/11/2011. (rban,) (Entered: 07/12/2011)
07/12/2011	231	Notice of Filing of Official Transcript re 230 Transcript.(rban,) (Entered: 07/12/2011)
07/14/2011	232	Joint MOTION Requesting Permission to Bring Computers and Trial Support Equipment Into the Courtroom for Trial by Amdocs (Israel) Limited. (Attachments: # 1 Proposed Order)(Lantier, Gregory) (Entered: 07/14/2011)
07/15/2011	233	ORDER granting application for Kevin Christopher Heffel to appear Pro hac vice Filing fee paid $ 50, receipt number 14683022936. Signed by District Judge Leonie M. Brinkema on 7/15/11. (Attachments: # 1 Receipt, # 2 Letter)(klau,) (Entered: 07/18/2011)
07/18/2011	234	Proposed Voir Dire by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 07/18/2011)
07/18/2011	235	*Joint* Proposed Jury Instructions by Amdocs (Israel) Limited. (Attachments: # 1 Appendix Amdocs' Proposed Verdict Form, # 2 Appendix Defendants' Proposed Verdict Form)(Lantier, Gregory) (Entered: 07/18/2011)
07/18/2011	236	Proposed Voir Dire by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 07/18/2011)
07/18/2011	237	NOTICE by Amdocs (Israel) Limited re 235 Proposed Jury Instructions *Notice of Corrected Submission* (Attachments: # 1 Corrected Appendix B to Joint Proposed Jury Instructions)(Lantier, Gregory) (Entered: 07/18/2011)
07/19/2011		Minute Entry for proceedings held before Magistrate Judge Thomas Rawles Jones, Jr: Settlement Conference held on 7/19/2011. There were seven (7) attendees. Conference lasted approx. one (1) hour. (cmar,) (Entered: 07/19/2011)
07/20/2011	238	ORDERED that the jury trial scheduled for Monday, July 25, 2011 at 10:00 a.m. be and is CANCELED, to be rescheduled at a later date, and it is furtherORDERED that the parties present their arguments regarding claim construction and noninfringement on Monday, July 25, 2011 at 10:00 a.m. In particular, the parties are instructed to be able to explain the patents and defendants' products in concrete terms. The hearing will only address claim construction and defendants' motion for summary judgment of noninfringement. Invalidity, inequitable conduct, and the motions in limine will be addressed at a later time. During the hearing, counsel may present any tutorials that they had planned to submit at trial. If counsel plan to use laptops, they are directed to call chambers to ensure that the computers comply with Court rules andare compatible with the Court's audio−visual presentation system. (See order for details)Signed by Magistrate Judge Thomas Rawles Jones, Jr on 07/20/11. (yguy) (Entered: 07/20/2011)
07/25/2011	239	Minute Entry for proceedings held before District Judge Leonie M. Brinkema: Motion Hearing held on 7/25/2011. Appearance of counsel. Defts' 95 MOTION for

		Summary Judgment and pltf's 98 MOTION for Partial Summary Judgment was argued in open court and TAKEN UNDER ADVISEMENT. (Court Reporter Thomson.) (yguy) (Entered: 07/25/2011)
07/27/2011	240	TRANSCRIPT of proceedings held on 7/25/2011 before Judge Brinkema. Court Reporter Anneliese Thomson, telephone number 703−299−8595. Transcript may be viewed at the court public terminal or purchased through the Court Reporter before the deadline for Release of Transcript Restriction. After that date it may be obtained through PACER Redaction Request due 8/26/2011. Redacted Transcript Deadline set for 9/26/2011. Release of Transcript Restriction set for 10/25/2011.(thomson, anneliese) (Entered: 07/27/2011)
07/28/2011	241	Notice of Filing of Official Transcript re 240 Transcript. (tche) (Entered: 07/28/2011)
03/02/2012	242	NOTICE by Amdocs (Israel) Limited *of Withdrawal as Counsel of Kevin C. Heffel* (Lantier, Gregory) (Entered: 03/02/2012)
03/27/2012	243	NOTICE by Amdocs (Israel) Limited *of Withdrawal as Counsel of Michelle E. Kanter* (Lantier, Gregory) (Entered: 03/27/2012)
03/28/2012	244	ORDER that 62 Motion to Seal is GRANTED, and document no. 64 shall remain under seal. Signed by Magistrate Judge Thomas Rawles Jones, Jr on 3/28/12. (klau,) (Entered: 03/28/2012)
03/28/2012	245	ORDER that the memorandum docketed as no. 67 shall remain under seal. Treating it as incorporating a 67 Motion to Seal, that motion is granted. Signed by Magistrate Judge Thomas Rawles Jones, Jr on 3/28/12. (klau,) Modified on 3/28/2012 to correct filed date (klau,). (Entered: 03/28/2012)
03/30/2012	246	ORDER that plaintiff's 115 Motion in Limine No. 1 is GRANTED. Plaintiff's 139 Motion in Limine No. 2 is GRANTED IN PART AND DENIED IN PART. Plaintiff's 141 Motion in Limine No. 3 is GRANTED to the extent that no evidence or argument concerning plaintiff's motivation in suing the defendant may be presented to the jury (see order for details). Signed by District Judge Leonie M. Brinkema on 3/30/12. (klau,) (Entered: 04/02/2012)
04/03/2012	247	ORDER defendant's 119 Motion in Limine No. 2 is GRANTED. Defendant's 128 Motion in Limine No. 6 is DENIED. Defendant's 134 Motion in Limine No. 9 is GRANTED to the extent that plaintiff not make any reference to the Court's opinion unless given permission by the Court during the trial. Defendant's 136 Motion in Limine No. 10 is GRANTED (see order for details). Signed by District Judge Leonie M. Brinkema on 4/3/2012. (klau,) (Entered: 04/04/2012)
09/27/2012	248	ORDER For the reasons to be explained in detail in a Memorandum Opinion to be issued in the near future, plaintiff's 98 Motion for Proposed Claim Constructions and Partial Summary Judgment is GRANTED in part to the extent that the construction of certain claims will be made by the Court and GRANTED as to inequitable conduct but DENIED in all other respects. The same Memorandum Opinion will provide the reasons why Openet's 95 Motion for Summary Judgment is GRANTED in part to the extent that the construction of certain claims in the patents at issue will be made by the Court and GRANTED as to non−infringement, but DENIED as to invalidity of the '065 patent because there are material issues of fact in dispute as to that issue. ORDERED that within fourteen (14) days of receipt of the Memorandum Opinion, the parties meet and confer about whether they want to take the invalidity claims to trial −−− all the pending motions in limine and motions related to the conduct of the trial, docketed as numbers 117 121 124 126 130 132 143 145 147 151 and 232 are DENIED as moot −−− sealing motions docketed as number 105 138 and 221 are GRANTED, as is the motion docketed as number 212 , which requests leave to correct certain document entries. Openet's 164 Motion to Strike is GRANTED. The Clerk is directed not to enter judgment under FRCP 58 until the Memorandum Opinion issues and the Court authorizes entry of a final judgment (see order for details). Signed by District Judge Leonie M. Brinkema on 9/27/12. (klau,) (Entered: 09/27/2012)
11/30/2012	249	MOTION Entry of Judgment *(AMDOCS MOTION FOR ENTRY OF JUDGMENT)* by Amdocs (Israel) Limited. (Attachments: # 1 Proposed Order)(Lantier, Gregory)

		(Entered: 11/30/2012)
11/30/2012	250	Memorandum in Support re 249 MOTION Entry of Judgment *(AMDOCS MOTION FOR ENTRY OF JUDGMENT) (MEMORANDUM IN SUPPORT OF AMDOCS MOTION FOR ENTRY OF JUDGMENT)* filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit 1)(Lantier, Gregory) (Entered: 11/30/2012)
11/30/2012	251	Notice of Hearing Date set for December 14, 2012 at 10:00 AM re 249 MOTION Entry of Judgment *(AMDOCS MOTION FOR ENTRY OF JUDGMENT)* (Lantier, Gregory) (Entered: 11/30/2012)
12/03/2012		Set Deadlines as to 249 MOTION Entry of Judgment *(AMDOCS MOTION FOR ENTRY OF JUDGMENT)*. Motion Hearing set for 12/14/2012 at 10:00 AM in Alexandria Courtroom 301 before Magistrate Judge Thomas Rawles Jones Jr. (clar,) (Entered: 12/03/2012)
12/03/2012		MOTIONS REFERRED to Magistrate Judge: Jones. 249 MOTION Entry of Judgment *(AMDOCS MOTION FOR ENTRY OF JUDGMENT)* (clar,) (Entered: 12/03/2012)
12/03/2012		Reset Deadlines as to 249 MOTION Entry of Judgment *(AMDOCS MOTION FOR ENTRY OF JUDGMENT)*. Motion Hearing set for 12/14/2012 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (clar,) (Entered: 12/03/2012)
12/11/2012	252	Opposition to 249 MOTION Entry of Judgment *(AMDOCS MOTION FOR ENTRY OF JUDGMENT)* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 12/11/2012)
12/12/2012		Notice of Correction re 252 Opposition, The signature block on the Certificate of Service does not match the user's login. The filing user has been notified to refile the Certificate of Service.(klau,) (Entered: 12/12/2012)
12/12/2012	253	CERTIFICATE of Service *(corrected)* re 252 Opposition by Joseph Shin on behalf of Openet Telecom LTD., Openet Telecom, Inc. (Shin, Joseph) (Entered: 12/12/2012)
12/13/2012	254	ORDER that the hearing on the plaintiff's re 249 MOTION for Entry of Judgment, currently scheduled for 10:00 a.m. on Friday, December 14, 2012, be and is RESCHEDULED for 10:00 a.m. on Friday, December 21, 2012. Signed by District Judge Leonie M. Brinkema on 12/13/12. (klau,) (Entered: 12/17/2012)
12/14/2012		Reset Deadlines as to 249 MOTION Entry of Judgment *(AMDOCS MOTION FOR ENTRY OF JUDGMENT)*. Motion Hearing set for 12/21/2012 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (clar,) (Entered: 12/14/2012)
12/20/2012	255	NOTICE of Appearance by Eric Weisblatt on behalf of Openet Telecom LTD., Openet Telecom, Inc. (Weisblatt, Eric) (Entered: 12/20/2012)
12/21/2012	256	Minute Entry for proceedings held before District Judge Leonie M. Brinkema:Motion Hearing held on 12/21/2012. Appearance of counsel. Pltf's 249 MOTION Entry of Judgment *(AMDOCS MOTION FOR ENTRY OF JUDGMENT) is argued and DENIED. (Order to follow) (Court Reporter A. Thomson.)(yguy) (Entered: 12/21/2012)*
12/21/2012	257	ORDER: For the reasons stated in open court, it is herebyORDERED that the plaintiff's Motion for Entry of Judgment [Dkt.No. 24 9] be and is DENIED.Signed by District Judge Leonie M. Brinkema on 12/21/12. (yguy) (Entered: 12/21/2012)
01/09/2013	258	TRANSCRIPT of proceedings for date of 12/21/2012, before Judge Brinkema, Court Reporter Anneliese Thomson, Telephone number 703−299−8595. **NOTICE RE REDACTION OF TRANSCRIPTS:The parties have thirty(30) calendar days to file with the Court a Notice of Intent to Request Redaction of this transcript. If no such Notice is filed, the transcript will be made remotely electronically available to the public without redaction after 90 calendar days. The policy is located on our website at www.vaed.uscourts.gov Transcript may be viewed at the court public terminal or purchased through the court**

		reporter before the deadline for Release of Transcript Restriction. After that date it may be obtained through PACER Redaction Request due 2/8/2013. Redacted Transcript Deadline set for 3/11/2013. Release of Transcript Restriction set for 4/9/2013.(thomson, anneliese) (Entered: 01/09/2013)
01/22/2013	259	MEMORANDUM OPINION. Signed by District Judge Leonie M. Brinkema on 1/22/13. (klau,) (Entered: 01/23/2013)
01/22/2013	260	ORDER that judgment be and is entered in favor of the defendants on all claims asserted by Amdocs (Israel) Limited in its First Amended Complaint for Patent Infringement [Dkt. No. 50]. ORDERED that judgment be and is entered in favor of the plaintiff on the inequitable conduct counterclaims (Counts IX and X) asserted by Openet Telecom, Inc., in its Answer and Counterclaims to Plaintiff Amdocs (Israel) Limited's First Amended Complaint for Patent Infringement [Dkt. No. 55]. ORDERED that the portion of the Order issued on September 27, 2012 [Dkt. No. 248] that required the parties to meet and confer about whether to take the invalidity claims to trial and to advise the Court of their decision be and is VACATED. ORDERED that the counterclaims for invalidity (Counts I, II, V, and VI) asserted in defendant Openet Telecom, Inc.'s Answer and Counterclaims to Plaintiff Amdocs (Israel) Limited's First Amended Complaint for Patent Infringement [Dkt. No. 55] be and are DISMISSED WITHOUT PREJUDICE. The Clerk is directed pursuant to Fed.R.Civ.P.58 to enter judgment in favor of the defendants on all claims in the First Amended Complaint [Dkt.No.50] and to enter judgment in favor of the plaintiff on defendant Openet telecom, Inc.'s Counterclaims IX and X (see order for details). Signed by District Judge Leonie M. Brinkema on 1/22/13. (klau,) (Entered: 01/23/2013)
01/23/2013	261	JUDGMENT pursuant to FRCP 58 in favor of the defendants on all claims in the First Amended Complaint [Dkt.No.50] and in favor of the plaintiff on defendant Openet telecom, Inc.'s Counterclaims IX and X. Entered by the Clerk.(klau,) (Entered: 01/23/2013)
01/23/2013	262	Report on the filing or determination of an action regarding patent and/or trademark(s) 6,836,797 &7,631,065.. (klau,) (Entered: 01/23/2013)
02/04/2013	263	BILL OF COSTS in the amount of $134,014.71 for Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Memorandum in Support of Bill of Costs, # 2 Affidavit Declaration of Joseph Shin, # 3 Exhibit A, # 4 Exhibit B, # 5 Exhibit C, # 6 Exhibit D, # 7 Exhibit E, # 8 Exhibit F, # 9 Exhibit G)(Shin, Joseph) Modified text on 2/5/2013 (klau,). (Entered: 02/04/2013)
02/19/2013	264	NOTICE OF APPEAL as to 261 Clerk's Judgment by Amdocs (Israel) Limited. Filing fee $ 455, receipt number 0422−3402026. (Lantier, Gregory) (Entered: 02/19/2013)
02/19/2013	265	Opposition to 263 Bill of Costs, filed by Amdocs (Israel) Limited. (Attachments: # 1 Affidavit Declaration of Gregory H. Lantier, # 2 Exhibit A, # 3 Exhibit B)(Lantier, Gregory) (Entered: 02/19/2013)
02/21/2013	266	Transmission of Notice of Appeal to US Federal Circuit re: 264 Notice of Appeal (pmil) (Entered: 02/21/2013)
02/25/2013	267	TRANSCRIPT of proceedings held on 4/21/2011, before Judge Brinkema, Court Reporter Anneliese Thomson, Telephone number 703−299−8595. **NOTICE RE REDACTION OF TRANSCRIPTS:The parties have thirty(30) calendar days to file with the Court a Notice of Intent to Request Redaction of this transcript. If no such Notice is filed, the transcript will be made remotely electronically available to the public without redaction after 90 calendar days. The policy is located on our website at www.vaed.uscourts.gov Transcript may be viewed at the court public terminal or purchased through the court reporter before the deadline for Release of Transcript Restriction. After that date it may be obtained through PACER Redaction Request due 3/27/2013. Redacted Transcript Deadline set for 4/29/2013. Release of Transcript Restriction set for 5/28/2013.(thomson, anneliese) (Entered: 02/25/2013)**
02/25/2013	268	Response to 265 Opposition *to Openet's Bill of Costs* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Affidavit Declaration of Joseph

		Shin, # 2 Exhibit 1, # 3 Exhibit 2, # 4 Exhibit 3, # 5 Exhibit D (Revised))(Shin, Joseph) (Entered: 02/25/2013)
02/27/2013	269	USCA Case Number for Federal Circuit 2013−1231 for 264 Notice of Appeal filed by Amdocs (Israel) Limited. (klau,) Modified on 3/20/2013 **Appeal no. 2013−1231 dismissed see dkt. no. 275**(klau,). (Entered: 02/27/2013)
02/27/2013	270	USCA for the Federal Circuit Case Number 13−1212 for 264 Notice of Appeal filed by Amdocs (Israel) Limited. (klau,) (Entered: 03/05/2013)
03/13/2013	271	ORDERED that each party submit to the Court in writing within 3 business days an explanation of (1) which party took the depositions of these thirteen witnesses, (2) which party paid the witnesses' travel expenses, and (3) if Openet paid the expenses for a deposition taken by Amdocs, why it did so. Signed by District Judge Leonie M. Brinkema on 3/13/2013. (rban,) (Entered: 03/13/2013)
03/15/2013	272	Response to 271 Order, *Openet's Written Submission Concerning Witness Expenses* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Shin, Joseph) (Entered: 03/15/2013)
03/18/2013	273	Response to 271 Order, *Response to the Court's March 13, 2013 Order* filed by Amdocs (Israel) Limited. (Attachments: # 1 Affidavit Declaration of Gregory H. Lantier, # 2 Exhibit C, # 3 Exhibit D)(Lantier, Gregory) (Entered: 03/18/2013)
03/19/2013	274	MOTION for Leave to File *Reply to Amdocs' Response to March 13, 2013 Order* by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit 1, # 2 Exhibit A, # 3 Exhibit B)(Shin, Joseph) (Entered: 03/19/2013)
03/19/2013	275	ORDER of USCA for the Federal Circuit as to 264 Notice of Appeal filed by Amdocs (Israel) Limited, Upon further review, the notice of appeal having been docketed in error. ORDERED that Appeal no. 2013−1231 is dismissed. Issued as a Mandate 3/19/13 (klau,) (Entered: 03/20/2013)
03/20/2013	276	ORDER granting 274 Motion for Leave to File Reply to Amdocs' Response to March 13, 2013 Order, ORDERED that Openet immediately file its Reply to Amdocs' Response to March 13, 2013 Order and the associated attachments. Signed by District Judge Leonie M. Brinkema on 3/20/13. (klau,) (Entered: 03/20/2013)
03/20/2013	277	Reply to 273 Response *to March 13, 2013 Order* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit A, # 2 Exhibit B)(Shin, Joseph) (Entered: 03/20/2013)
03/21/2013	278	MEMORANDUM OPINION. Signed by District Judge Leonie M. Brinkema on 3/21/2013. (rban,) (Entered: 03/22/2013)
03/21/2013	279	ORDERED that the defendants' Bill of Costs 263 be and is GRANTED, but in the reduced amount of $89,207.90. Signed by District Judge Leonie M. Brinkema on 3/21/2013. (rban,) (Entered: 03/22/2013)
04/05/2013	280	STIPULATION *Joint Stipulation Regarding Stay of Costs Pending Appeal* by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 04/05/2013)
04/05/2013	281	So Ordered re 280 Joint Stipulation Regarding Stay of Cost Award Pending Appeal filed by Amdocs (Israel) Limited. Signed by District Judge Leonie M. Brinkema on 4/5/13. (klau,) (Entered: 04/09/2013)
08/01/2014	282	PUBLISHED Opinion of USCA, decided 8/1/2014 re 264 Notice of Appeal, Affirmed in Part, Reversed in Part, Vacated and Remanded. (rban,) (Entered: 08/01/2014)
08/01/2014	283	USCA JUDGMENT as to 264 Notice of Appeal filed by Amdocs (Israel) Limited. The mandate will be issued in due course. (rban,) (Entered: 08/01/2014)
09/08/2014	284	USCA Mandate re 264 Notice of Appeal. In accordance with the judgment of this Court, entered 8/1/2014, and pursuant to Rule 41(a) of FRAP, the formal mandate is hereby issued. (rban,) (Entered: 09/08/2014)

09/08/2014	285	ORDER it is hereby ORDERED that the parties meet and confer; and it is furtherORDERED that the parties notice a status hearing for a Friday in October, at which counsel should be prepared to discuss the trial schedule. Signed by District Judge Leonie M. Brinkema on 9/8/14. (gwalk,) (Entered: 09/08/2014)
09/15/2014	286	NOTICE of Appearance by Brittany Blueitt Amadi on behalf of Amdocs (Israel) Limited (Amadi, Brittany) (Entered: 09/15/2014)
09/16/2014	287	Notice of Hearing Date *for Status Hearing* set for 10/17/2014 re 285 Order, (Lantier, Gregory) (Entered: 09/16/2014)
09/16/2014	288	Motion to appear Pro Hac Vice by Violetta G. Watson and Certification of Local Counsel Gregory H. Lantier Filing fee $ 75, receipt number 0422−4115098. by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 09/16/2014)
09/16/2014	289	Motion to appear Pro Hac Vice by Corinne E. Atton and Certification of Local Counsel Gregory H. Lantier Filing fee $ 75, receipt number 0422−4115104. by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 09/16/2014)
09/17/2014		Set Deadlines/Hearings Status Conference set for 10/17/2014 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (clar,) (Entered: 09/17/2014)
09/22/2014	290	ORDERED that the parties appear for a status hearing on 10/16/2014 at 10:00 a.m. Signed by District Judge Leonie M. Brinkema on 9/22/2014. (rban,) (Entered: 09/22/2014)
09/22/2014		Set Hearing: Status Conference set for 10/16/2014 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (rban,) (Entered: 09/22/2014)
09/22/2014	291	ORDER granting 288 Motion for Pro hac vice. Signed by District Judge Leonie M. Brinkema on 9/22/2014. (rban,) (Entered: 09/22/2014)
09/22/2014	292	ORDER granting 289 Motion for Pro hac vice. Signed by District Judge Leonie M. Brinkema on 9/22/2014. (rban,) (Entered: 09/22/2014)
09/26/2014	293	MOTION for Judgment on the Pleadings by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Proposed Order)(Pandya, Brian) (Entered: 09/26/2014)
09/26/2014	294	Memorandum in Support re 293 MOTION for Judgment on the Pleadings filed by Openet Telecom LTD., Openet Telecom, Inc.. (Attachments: # 1 Exhibit 1, # 2 Exhibit 2, # 3 Exhibit 3, # 4 Exhibit 4)(Pandya, Brian) (Entered: 09/26/2014)
09/26/2014	295	Notice of Hearing Date set for 10/16/2014 re 293 MOTION for Judgment on the Pleadings (Pandya, Brian) (Entered: 09/26/2014)
09/29/2014		Set Deadlines as to 293 MOTION for Judgment on the Pleadings . Motion Hearing set for 10/16/2014 at 10:00 AM in Alexandria Courtroom 600 before District Judge Leonie M. Brinkema. (clar,) (Entered: 09/29/2014)
10/09/2014	296	STATUS REPORT *Joint Proposed Pre−Trial Plan* by Amdocs (Israel) Limited. (Lantier, Gregory) (Entered: 10/09/2014)
10/10/2014	297	Opposition to 293 MOTION for Judgment on the Pleadings filed by Amdocs (Israel) Limited. (Attachments: # 1 Exhibit A, # 2 Exhibit B, # 3 Affidavit Declaration of Dr. Ellen W. Zegura)(Lantier, Gregory) (Entered: 10/10/2014)
10/14/2014	298	REPLY to Response to Motion re 293 MOTION for Judgment on the Pleadings *Reply to Amdocs' Opposition* filed by Openet Telecom LTD., Openet Telecom, Inc.. (Pandya, Brian) (Entered: 10/14/2014)
10/16/2014	299	Minute Entry for proceedings held before District Judge Leonie M. Brinkema:Motion Hearing/Status Conference held on 10/16/2014. Appearance of counsel. Deft's 293 MOTION for Judgment on the Pleadings is argued and TAKEN UNDER ADVISEMENT. (Court Reporter A. Thomson.)(yguy) (Entered: 10/16/2014)

10/24/2014	300	TRANSCRIPT of proceedings held on 10/16/2014, before Judge Leonie M. Brinkema, Court Reporter Anneliese Thomson, Telephone number 703−299−8595. **NOTICE RE REDACTION OF TRANSCRIPTS:The parties have thirty(30) calendar days to file with the Court a Notice of Intent to Request Redaction of this transcript. If no such Notice is filed, the transcript will be made remotely electronically available to the public without redaction after 90 calendar days. The policy is located on our website at www.vaed.uscourts.gov Transcript may be viewed at the court public terminal or purchased through the court reporter before the deadline for Release of Transcript Restriction. After that date it may be obtained through PACER Redaction Request due 11/24/2014. Redacted Transcript Deadline set for 12/24/2014. Release of Transcript Restriction set for 1/22/2015.(thomson, anneliese) (Entered: 10/24/2014)**
10/24/2014	301	MEMORANDUM OPINION: For the reasons stated above, Defendants' Motion forJudgment on the Pleadings [Dkt. No. 293] will be GRANTED by an appropriate Order to be issued with this Memorandum Opinion. Signed by District Judge Leonie M. Brinkema on 10/24/14. (yguy) (Entered: 10/24/2014)
10/24/2014	302	ORDER: For the reasons stated in the accompanying Memorandum Opinion,Defendants' Motion for Judgment on the Pleadings [Dkt. No. 293] is GRANTED, and it is hereby ORDERED that judgment be and is entered in favor of the defendants. Signed by District Judge Leonie M. Brinkema on 10/24/14. (yguy) (Entered: 10/24/2014)
10/24/2014	303	CLERK'S JUDGMENT: Judgment in favor of the defendants Openet Telecom, Inc. et al. (yguy) (Entered: 10/24/2014)
11/12/2014	304	Report on the filing or determination of an action regarding patent and/or trademark(s) 6,836,797 and 7,631,065. (Attachments: # 1 Memorandum Opinion, # 2 Court Order)(rban,) (Entered: 11/12/2014)
11/21/2014	305	NOTICE OF APPEAL as to 303 Clerk's Judgment by Amdocs (Israel) Limited. Filing fee $ 505, receipt number 0422−4204067. (Lantier, Gregory) (Entered: 11/21/2014)
11/25/2014	306	Transmission of Notice of Appeal to US Federal Circuit re 305 Notice of Appeal (klau,) (Entered: 11/25/2014)
12/05/2014	307	USCA Case Number 15−1180 Federal Circuit Court of Appeals for 305 Notice of Appeal filed by Amdocs (Israel) Limited. (Attachments: # 1 Notice of Appeal Package)(klau,) (Entered: 12/08/2014)

FILED

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

2010 AUG 16 A 9:45

CLERK US DISTRICT COURT ALEXANDRIA, VIRGINIA

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff,	:	Case No.: 1:10cv940 LMB/TRJ
v.	:	JURY TRIAL DEMANDED
OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation, Defendants.	:	

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff, Amdocs (Israel) Limited ("Amdocs") for its Complaint For Patent Infringement against Defendants Openet Telecom, Inc. and Openet Telecom Ltd. alleges as follows:

PARTIES

1. Plaintiff Amdocs is an Israeli corporation having its principal place of business at 8 Hapnina Street, Ra'anana, 4300 Israel.

2. On information and belief, defendant Openet Telecom, Inc. is a Delaware corporation having a principal place of business at 11465 Sunset Hills Road, Suite 310, Reston, VA 20190.

3. On information and belief, defendant Openet Telecom Ltd. is an Irish corporation having a principal place of business at 6 Beckett Way, Park West Business Park, Dublin 12, Ireland.

4. On information and belief, Openet Telecom, Inc. and Openet Telecom Ltd. are in the business of developing and providing convergent mediation software and systems to customers in the United States and this Judicial District under the name FusionWorks.

JURISDICTION AND VENUE

5. This is an action for patent infringement arising under the patent laws of the United States, Title 35, United States Code.

6. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

7. Venue is proper in this district pursuant to 28 U.S.C. §§ 1391(b), 1391(c) and 1400(b).

8. On information and belief, Openet Telecom, Inc. is subject to this Court's personal jurisdiction because it is located in the Eastern District of Virginia, has transacted business in this Judicial District, and/or has committed, contributed to, and/or induced acts of patent infringement in this District.

9. On information and belief, Openet Telecom Ltd. is subject to this Court's personal jurisdiction because it, directly or through intermediaries, has transacted business in this Judicial District, and/or has committed, contributed to, and/or induced acts of patent infringement in this District.

PATENT INFRINGEMENT COUNTS

10. Amdocs is the owner of all right, title, and interest in U.S. Patent Nos. 6,836,797 and 7,631,065, which Defendants are infringing and/or inducing others to infringe by, among other things, making, using, making available for another's use, offering to sell or selling in the United States, or importing into the United States, products or processes that practice inventions claimed in the said patents.

11. Defendants have profited through infringement of the said patents. As a result of Defendants' unlawful infringement of the said patents, Amdocs is entitled to recover from Defendants damages suffered by Amdocs as a result of Defendants' unlawful acts.

12. On information and belief, Defendants' continued infringement subsequent to notice of said patents is willful and deliberate, entitling Amdocs to enhanced damages and reasonable attorney fees and costs. Amdocs has provided Defendants notice of infringement through service of this complaint.

13. On information and belief, Defendants intend to continue their unlawful infringing activity, and Amdocs continues to and will continue to suffer irreparable harm—for which there is no adequate remedy at law—from such unlawful infringing activity unless Defendants are enjoined by this Court.

COUNT I

INFRINGEMENT OF U.S. PATENT NO. 6,836,797

14. Amdocs realleges and incorporates by reference the allegations set forth in paragraphs 1 – 13.

15. Amdocs is the owner of all right, title, and interest in U.S. Patent No. 6,836,797 ("the '797 patent"), entitled "System, Method and Computer Program Product For Network

Record Synthesis," duly and properly issued by the U.S. Patent and Trademark Office on December 28, 2004. A copy of the '797 patent is attached as Exhibit A.

16. Defendants have been and/or are directly infringing, inducing infringement of, and/or contributing to the infringement of the '797 patent by, among other things, making, using, making available for another's use, offering to sell or selling in the United States, or importing into the United States, hardware and software, including but not limited to FusionWorks mediation products, that embody or incorporate, or the operation of which otherwise practices, one or more claims of the '797 patent.

17. By reason of Defendants' infringing activities, Amdocs is suffering and will continue to suffer substantial damages in an amount to be determined at trial.

18. Defendants' acts complained of herein are damaging and will continue to damage Amdocs irreparably. Amdocs has no adequate remedy at law for these wrongs and injuries. Amdocs is therefore entitled to an injunction restraining and enjoining Defendants from infringing the claims of the '797 patent.

COUNT II

INFRINGEMENT OF U.S. PATENT NO. 7,631,065

19. Amdocs realleges and incorporates by reference the allegations set forth in paragraphs 1 – 13.

20. Amdocs is the owner of all right, title, and interest in U.S. Patent No. 7,631,065 ("the '065 patent"), entitled "System, Method and Computer Program Product For Merging Data in a Network-Based Filtering and Aggregating Platform," duly and properly issued by the U.S. Patent and Trademark Office on December 8, 2009. A copy of the '065 patent is attached as Exhibit B.

21. Defendants have been and/or are directly infringing, inducing infringement of, and/or contributing to the infringement of the '065 patent by, among other things, making, using, making available for another's use, offering to sell or selling in the United States, or importing into the United States, hardware and software, including but not limited to FusionWorks mediation products, that embody or incorporate, or the operation of which otherwise practices, one or more claims of the '065 patent.

22. By reason of Defendants' infringing activities, Amdocs is suffering and will continue to suffer substantial damages in an amount to be determined at trial.

23. Defendants' acts complained of herein are damaging and will continue to damage Amdocs irreparably. Amdocs has no adequate remedy at law for these wrongs and injuries. Amdocs is therefore entitled to an injunction restraining and enjoining Defendants from infringing the claims of the '065 patent.

DEMAND FOR JURY TRIAL

24. Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, Amdocs respectfully requests a trial by jury on all issues properly triable by jury.

PRAYER FOR RELIEF

WHEREFORE, Amdocs prays for relief as follows:

A. For a judgment declaring that Defendants have directly infringed, actively induced infringement of, and/or committed acts of contributory infringement of, at least one claim of each of the '797 and '065 patents;

B. For a judgment awarding Amdocs compensatory damages as a result of Defendants' infringement of the '797 and '065 patents, together with interest and costs, and in no event less than a reasonable royalty;

C. For a judgment declaring that Defendants' infringement of the '797 and '065 patents has been willful and deliberate;

D. For a judgment awarding Amdocs pre-judgment and post-judgment interest;

E. For a judgment awarding Amdocs treble damages under 35 U.S.C. § 284 as a result of Defendants' willful and deliberate infringement;

F. For a judgment declaring that this case is exceptional and awarding Amdocs its expenses, costs, and attorney fees in accordance with 35 U.S.C. §§ 284 and 285 and Rule 54(d) of the Federal Rules of Civil Procedure;

G. For a grant of preliminary and permanent injunctions pursuant to 35 U.S.C. § 283, enjoining Defendants from further acts of infringement; and

H. For such other and further relief as the Court deems just and proper.

Respectfully submitted,

Gregory H. Lantier (Bar. No. 65657)
WILMER, CUTLER, PICKERING,
HALE AND DORR LLP
1875 Pennsylvania Avenue, N.W.
Washington, DC 20006
Phone: (202) 663-6000
Fax: (202) 663-6363
Attorney for Plaintiff
Amdocs (Israel) Limited

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation,	:	Case No. 1:10cv910 (LMB/TRJ)
Plaintiff,	:	**JURY TRIAL DEMANDED**
v.	:	
OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation,	:	
Defendants.	:	

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff, Amdocs (Israel) Limited ("Amdocs") for its First Amended Complaint For Patent Infringement against Defendants Openet Telecom, Inc. and Openet Telecom Ltd. alleges as follows:

PARTIES

1. Plaintiff Amdocs is an Israeli corporation having its principal place of business at 8 Hapnina Street, Ra'anana, 4300 Israel.

2. On information and belief, defendant Openet Telecom, Inc. is a Delaware corporation having a principal place of business at 11465 Sunset Hills Road, Suite 310, Reston, VA 20190.

3. On information and belief, defendant Openet Telecom Ltd. is an Irish corporation having a principal place of business at 6 Beckett Way, Park West Business Park, Dublin 12, Ireland.

4. On information and belief, Openet Telecom, Inc. and Openet Telecom Ltd. are in the business of developing and providing convergent mediation software and systems to customers in the United States and this Judicial District under the name FusionWorks.

JURISDICTION AND VENUE

5. This is an action for patent infringement arising under the patent laws of the United States, Title 35, United States Code.

6. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

7. Venue is proper in this district pursuant to 28 U.S.C. §§ 1391(b), 1391(c) and 1400(b).

8. On information and belief, Openet Telecom, Inc. is subject to this Court's personal jurisdiction because it is located in the Eastern District of Virginia, has transacted business in this Judicial District, and/or has committed, contributed to, and/or induced acts of patent infringement in this District.

9. On information and belief, Openet Telecom Ltd. is subject to this Court's personal jurisdiction because it, directly or through intermediaries, has transacted business in this Judicial District, and/or has committed, contributed to, and/or induced acts of patent infringement in this District.

PATENT INFRINGEMENT COUNTS

10. Amdocs is the owner of all right, title, and interest in U.S. Patent Nos. 6,836,797, 7,631,065, 7,412,510, and 6,947,984 which Defendants are infringing and/or inducing others to infringe by, among other things, making, using, making available for another's use, offering to sell or selling in the United States, or importing into the United States, products or processes that practice inventions claimed in the said patents.

11. Defendants have profited through infringement of the said patents. As a result of Defendants' unlawful infringement of the said patents, Amdocs is entitled to recover from Defendants damages suffered by Amdocs as a result of Defendants' unlawful acts.

12. On information and belief, Defendants' continued infringement subsequent to notice of said patents is willful and deliberate, entitling Amdocs to enhanced damages and reasonable attorney fees and costs. Amdocs has provided Defendants notice of infringement through service of this complaint.

13. On information and belief, Defendants intend to continue their unlawful infringing activity, and Amdocs continues to and will continue to suffer irreparable harm—for which there is no adequate remedy at law—from such unlawful infringing activity unless Defendants are enjoined by this Court.

COUNT I

INFRINGEMENT OF U.S. PATENT NO. 6,836,797

14. Amdocs realleges and incorporates by reference the allegations set forth in paragraphs 1 – 13.

15. Amdocs is the owner of all right, title, and interest in U.S. Patent No. 6,836,797 ("the '797 patent"), entitled "System, Method and Computer Program Product For Network

Record Synthesis," duly and properly issued by the U.S. Patent and Trademark Office on December 28, 2004. A copy of the '797 patent is attached as Exhibit A.

16. Defendants have been and/or are directly infringing, inducing infringement of, and/or contributing to the infringement of the '797 patent by, among other things, making, using, making available for another's use, offering to sell or selling in the United States, or importing into the United States, hardware and software, including but not limited to FusionWorks mediation products, that embody or incorporate, or the operation of which otherwise practices, one or more claims of the '797 patent.

17. By reason of Defendants' infringing activities, Amdocs is suffering and will continue to suffer substantial damages in an amount to be determined at trial.

18. Defendants' acts complained of herein are damaging and will continue to damage Amdocs irreparably. Amdocs has no adequate remedy at law for these wrongs and injuries. Amdocs is therefore entitled to an injunction restraining and enjoining Defendants from infringing the claims of the '797 patent.

COUNT II

INFRINGEMENT OF U.S. PATENT NO. 7,631,065

19. Amdocs realleges and incorporates by reference the allegations set forth in paragraphs 1 – 13.

20. Amdocs is the owner of all right, title, and interest in U.S. Patent No. 7,631,065 ("the '065 patent"), entitled "System, Method and Computer Program Product For Merging Data in a Network-Based Filtering and Aggregating Platform," duly and properly issued by the U.S. Patent and Trademark Office on December 8, 2009. A copy of the '065 patent is attached as Exhibit B.

21. Defendants have been and/or are directly infringing, inducing infringement of, and/or contributing to the infringement of the ‘065 patent by, among other things, making, using, making available for another’s use, offering to sell or selling in the United States, or importing into the United States, hardware and software, including but not limited to FusionWorks mediation products, that embody or incorporate, or the operation of which otherwise practices, one or more claims of the ‘065 patent.

22. By reason of Defendants’ infringing activities, Amdocs is suffering and will continue to suffer substantial damages in an amount to be determined at trial.

23. Defendants’ acts complained of herein are damaging and will continue to damage Amdocs irreparably. Amdocs has no adequate remedy at law for these wrongs and injuries. Amdocs is therefore entitled to an injunction restraining and enjoining Defendants from infringing the claims of the ‘065 patent.

COUNT III

INFRINGEMENT OF U.S. PATENT NO. 7,412,510

24. Amdocs realleges and incorporates by reference the allegations set forth in paragraphs 1 – 13.

25. Amdocs is the owner of all right, title, and interest in U.S. Patent No. 7,412,510 (“the ‘510 patent”), entitled “System, Method and Computer Program Product For Reporting on the Collection of Network Usage Information,” duly and properly issued by the U.S. Patent and Trademark Office on August 12, 2008. A copy of the ‘510 patent is attached as Exhibit C.

26. Openet has been and/or is directly infringing the ‘510 patent by, among other things, making, using, making available for another’s use, offering to sell or selling in the United

States the hardware and software, that embody or incorporate, or the operation of which otherwise practices, one or more claims of the ‘510 patent.

COUNT IV

INFRINGEMENT OF U.S. PATENT NO. 6,947,984

27. Amdocs realleges and incorporates by reference the allegations set forth in paragraphs 1 – 13.

28. Amdocs is the owner of all right, title, and interest in U.S. Patent No. 6,947,984 (“the ‘984 patent”), entitled “System, Method and Computer Program Product For Reporting in a Network-Based Filtering and Aggregating Platform,” duly and properly issued by the U.S. Patent and Trademark Office on September 20, 2005. A copy of the ‘984 patent is attached as Exhibit D.

29. Openet has been and/or is directly infringing the ‘984 patent by, among other things, making, using, making available for another’s use, offering to sell or selling in the United States the hardware and software, that embody or incorporate, or the operation of which otherwise practices, one or more claims of the ‘984 patent.

DEMAND FOR JURY TRIAL

30. Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, Amdocs respectfully requests a trial by jury on all issues properly triable by jury.

PRAYER FOR RELIEF

WHEREFORE, Amdocs prays for relief as follows:

A. For a judgment declaring that Defendants have directly infringed, actively induced infringement of, and/or committed acts of contributory infringement of, at least one claim of each of the ‘797, ‘065, ‘510, and ‘984 patents;

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B. For a judgment awarding Amdocs compensatory damages as a result of Defendants' infringement of the '797, '065, '510, and '984 patents, together with interest and costs, and in no event less than a reasonable royalty;

C. For a judgment declaring that Defendants' infringement of the '797, '065, '510, and '984 patents has been willful and deliberate;

D. For a judgment awarding Amdocs pre-judgment and post-judgment interest;

E. For a judgment awarding Amdocs treble damages under 35 U.S.C. § 284 as a result of Defendants' willful and deliberate infringement;

F. For a judgment declaring that this case is exceptional and awarding Amdocs its expenses, costs, and attorney fees in accordance with 35 U.S.C. §§ 284 and 285 and Rule 54(d) of the Federal Rules of Civil Procedure;

G. For a grant of preliminary and permanent injunctions pursuant to 35 U.S.C. § 283, enjoining Defendants from further acts of infringement; and

H. For such other and further relief as the Court deems just and proper.

Respectfully Submitted, February 3, 2011

__/s/____________________________
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Counsel for Amdocs (Israel) Limited

IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation,

Plaintiff,

v.

OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation,

Defendants.

Case No. 1:10-cv-910 (LMB/TRJ)

JURY TRIAL DEMANDED

DEFENDANT OPENET TELECOM, INC.'S ANSWER AND COUNTERCLAIMS TO PLAINTIFF AMDOCS (ISRAEL) LIMITED'S FIST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Defendant Openet Telecom, Inc. ("Defendant" or "Openet") hereby submits its Answer and Counterclaims to Plaintiff Amdocs (Israel) Limited's ("Plaintiff" or "Amdocs") First Amended Complaint ("Complaint") for Patent Infringement.

PARTIES

1. Openet is without knowledge or information sufficient to form a belief as to the truth of allegations of Paragraph 1 and therefore denies same.

2. Admitted.

3. Admitted.

4. Openet admits that it provides software and systems, including convergent mediation software, under the name FusionWorks to customers in the United States. Except as expressly admitted, Openet denies all other allegations of Paragraph 4.

45. The '984 patent is unenforceable for inequitable conduct for the reasons set forth in Counterclaim X, Paragraphs 82-99, *infra.*

OPENET'S COUNTERCLAIMS

Openet, for its counterclaims against Amdocs, makes the following allegations:

46. Openet hereby incorporates by reference as if fully set forth herein each answer and each defense stated above.

47. This Court has jurisdiction over the subject matter of these counterclaims under 28 U.S.C. §§ 1331, 1338, and 2201 and 35 U.S.C. § 1, *et seq*.

48. Based on the allegations in Amdocs' Complaint and on Amdocs filing this action, this Court has personal jurisdiction over Amdocs.

49. Based on the allegations in Amdocs' Complaint, venue is proper in this district pursuant to 28 U.S.C. §§ 1391 and 1400(b).

50. In its Complaint, Amdocs asserts that it is the owner of the '797, '065, '510, and '984 patents.

51. In its Complaint, Amdocs asserts that the '797, '065, '510, and '984 patents have been infringed by Openet.

52. There is a substantial and continuing controversy between Openet and Amdocs as to Amdocs' allegations of infringement of the '797, '065, '510, and '984 patents.

COUNTERCLAIM COUNT I
(Invalidity of U.S. Patent No. 6,836,797)

53. Openet restates and realleges each of the foregoing paragraphs as if fully set forth herein.

54. All claims of the '797 patent are invalid for failing to meet one or more conditions for patentability set forth in, *inter alia*, 35 U.S.C. §§ 101, 102, 103, and/or 112.

COUNTERCLAIM COUNT II
(Invalidity of U.S. Patent No. 7,631,065)

55. Openet restates and realleges each of the foregoing paragraphs as if fully set forth herein.

56. All claims of the '065 patent are invalid for failing to meet one or more conditions for patentability set forth in, *inter alia*, 35 U.S.C. §§ 101, 102, 103, and/or 112.

COUNTERCLAIM COUNT III
(Non-infringement of U.S. Patent No. 6,836,797)

57. Openet restates and realleges each of the foregoing paragraphs as if fully set forth herein.

58. Openet has not infringed, either literally or under the doctrine of equivalents, any properly construed, valid, and enforceable claims of the '797 patent. Further, Openet has not directly infringed, induced infringement of, or contributed to the infringement of any valid, enforceable, and properly construed claims of the '797 patent.

COUNTERCLAIM COUNT IV
(Non-infringement of U.S. Patent No. 7,631,065)

59. Openet restates and realleges each of the foregoing paragraphs as if fully set forth herein.

60. Openet has not infringed, either literally or under the doctrine of equivalents, any properly construed, valid, and enforceable claims of the '065 patent.

Further, Openet has not directly infringed, induced infringement of, or contributed to the infringement of any valid, enforceable, and properly construed claims of the '065 patent.

COUNTERCLAIM COUNT V
(Invalidity of U.S. Patent No. 7,412,510)

61. Openet restates and realleges each of the foregoing paragraphs as if fully set forth herein.

62. All claims of the '510 patent are invalid for failing to meet one or more conditions for patentability set forth in, *inter alia*, 35 U.S.C. §§ 101, 102, 103, and/or 112.

COUNTERCLAIM COUNT VI
(Invalidity of U.S. Patent No. 6,947,984)

63. Openet restates and realleges each of the foregoing paragraphs as if fully set forth herein.

64. All claims of the '984 patent are invalid for failing to meet one or more conditions for patentability set forth in, *inter alia*, 35 U.S.C. §§ 101, 102, 103, and/or 112.

COUNTERCLAIM COUNT VII
(Non-infringement of U.S. Patent No. 7,412,510)

65. Openet restates and realleges each of the foregoing paragraphs as if fully set forth herein.

66. Openet has not infringed, either literally or under the doctrine of equivalents, any properly construed, valid, and enforceable claims of the '510 patent. Further, Openet has not directly infringed, induced infringement of, or contributed to the infringement of any valid, enforceable, and properly construed claims of the '510 patent.

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COUNTERCLAIM COUNT VIII
(Non-infringement of U.S. Patent No. 6,947,984)

67. Openet restates and realleges each of the foregoing paragraphs as if fully set forth herein.

68. Openet has not infringed, either literally or under the doctrine of equivalents, any properly construed, valid, and enforceable claims of the ‘984 patent. Further, Openet has not directly infringed, induced infringement of, or contributed to the infringement of any valid, enforceable, and properly construed claims of the ‘984 patent

COUNTERCLAIM COUNT IX
(Unenforceability of U.S. Patent No. 7,631,065 In View of U.S. Patent No. 5,784,443)

69. Openet restates and realleges each of the foregoing paragraphs as if fully set forth herein.

70. The ‘065 patent is unenforceable for inequitable conduct due to the withholding from the U.S. Patent and Trademark Office (“PTO”), with intent to deceive the patent examiner, U.S. Patent No. 5,784,443, a prior art reference that is material to the patentability of one or more claims of the ‘065 patent.

71. The ‘065 patent was filed on December 7, 2001 as a continuation of Patent Application No. 09/442,876, filed November 18, 1999. The ‘065 patent issued on December 8, 2009. The ‘065 patent purports to claim priority to Provisional Application Nos. 60/066,898, filed November 20, 1997, and 60/109,095, filed November 19, 1998. Limor Schweitzer, Eran Wagner, and Tal Givoly are identified on the face of the ‘065 patent as inventors. The ‘065 patent was prosecuted by Kevin Zilka.

72. Limor Schweitzer and Tal Givoly are also identified on the face of the '797 patent as inventors of that patent. Additionally, the '797 patent was also prosecuted by Kevin Zilka.

73. U.S. Patent No. 5,784,443 ("the '443 patent"), titled "Integrated Revenue Domain for Telecommunications Networks" and identifying Jeffrey Chapman, John Reynolds, Steve Brandenburg, and Samuel Howlette as inventors, was filed on February 1, 1996 and issued on July 21, 1998.

74. The '443 patent is prior art to the '065 patent under, *inter alia*, 35 U.S.C. 102(b), as it issued more than one year before the filing of the '065 patent. To the extent one or more claims of the '065 patent are entitled to claim priority to either or both provisional applications referenced in the '065 patent, the '443 patent is prior art to the '065 patent under, *inter alia*, 35 U.S.C. § 102(e)(2), as the '443 patent is a patent granted on an application filed before the priority date of the '065 patent.

75. The '443 patent is anticipatory prior art to the '065 patent. For example, each limitation of claim 1 is disclosed in the specification of the '443 patent, e.g., the '443 patent discloses "[a] computer program product embodied on a computer readable storage medium for processing network accounting information comprising" ('443 patent, Col. 1, ll. 53-57), "computer code for receiving from a first source a first network accounting record" (Col. 2, ll. 50-58), "computer code for correlating the first network accounting record with accounting information available from a second source" (Col. 3, ll. 56-59), and "computer code for using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record"

(Col. 3, ll. 56-59 and Col. 3, l. 65 – Col. 4, l. 15). Accordingly, the '443 patent is highly material to the patentability of the claims of the '065 patent.

76. Messrs. Schweitzer, Givoly, and/or Zilka were aware of the '443 patent during the prosecution of the '065 patent, as the '443 patent was cited by the patent examiner as prior art during the prosecution of the '797 patent in an attachment to an Office Action dated October 20, 2003.

77. Several other prior art references identified by the patent examiner in the October 20, 2003 Office Action, including U.S. Patent No. 5,793,853, 6,032,147, and 6,157,648 were submitted to the PTO during the prosecution of the '065 patent by way of an Information Disclosure Statement ("IDS") filed by Mr. Zilka on April 15, 2009. However, the '443 patent was withheld from the PTO.

78. Based on the high materiality of the '443 patent, it can be inferred that Mr. Zilka, acting alone or in concert with Mr. Givoly, Mr. Schweitzer, and/or other individuals associated with Amdocs that were substantively involved in the prosecution of the '065 patent, withheld the '443 patent from the PTO intending to deceive the patent examiner.

79. Intent to deceive also can be inferred from the pattern of selective disclosure during the prosecution of the '065 patent of references cited in the prosecution of the '797 patent (and in the prosecution of other Amdocs patents). For example, based on the fact that some but not all references identified during the prosecution of the '797 patent were subsequently disclosed to the PTO during the prosecution of the '065, it can be inferred that Mr. Zilka, acting alone or in concert with Mr. Givoly, Mr. Schweitzer, and/or other individuals associated with Amdocs that were substantively involved in the

prosecution of the ‘065 patent, cherry-picked known references to disclose to the PTO while concealing other relevant references, including the ‘443 patent.

80. The concealment of the ‘443 patent violated the duty to disclose material information under 37 C.F.R. § 1.56(c).

81. Because the ‘443 patent was concealed with intent to deceive the patent examiner, the ‘065 patent is unenforceable for inequitable conduct.

COUNTERCLAIM COUNT X
(Unenforceability of U.S. Patent Nos. 6,836,797, 7,631,065, 7,412,510, and 6,947,984 In View of XaCCT Prior Art Systems)

82. Openet restates and realleges each of the foregoing paragraphs as if fully set forth herein.

83. The ‘065, ‘797, ‘984, and ‘510 patents are unenforceable for inequitable conduct due to the withholding of information regarding systems offered by XaCCT Technologies, Ltd. and/or Xpert Unix Systems Ltd. (both predecessors to Amdocs) that were sold, offered for sale, and/or in public use before the filing of the ‘065, ‘797, ‘984, and ‘510 patents. For example, XaCCT 2.0 was sold, available for sale or in public use at least as early as December 1996, and XaCCT 2.1 was sold, available for sale or in public use at least as early as spring 1997.

84. XaCCT 2.0 and 2.1 are prior art to the ‘065 patent under 35 U.S.C. 102(b), as both systems were on sale or in public use more than one year before the filing of the ‘065 patent. To the extent one or more claims of the ‘065 patent are entitled to claim priority to either or both provisional applications referenced in the ‘065 patent, XaCCT 2.0 and 2.1 are prior art to the ‘065 patent under at least 35 U.S.C. § 102(a), as both systems were used by others prior to the filing dates of the provisional applications.

85. The '797 patent was filed on October 23, 2001 as a continuation-in-part of Patent Application No. 09/442,876, filed November 18, 1999. The '797 also purports to claim priority to Provisional Application No. 60/242,733, filed October 23, 2000.

86. Thus, regardless of the effective filing date of the '797 patent, XaCCT 2.0 and 2.1 are prior art to the '797 patent under 35 U.S.C. 102(b), as both systems were on sale or in public use more than one year before the filing of the '797 patent.

87. The '984 patent was filed on August 21, 2001 as a continuation of Patent Application 09/442,876, filed November 18, 1999, which claims priority to PCT Application US98/24963, filed November 20, 1998. Further, the '984 patent purports to claim priority to Provisional Application Nos. 60/109,095, filed November 19, 1998, and 60/066,898, filed November 20, 1997.

88. Thus, XaCCT 2.0 and 2.1 are prior art to the '984 patent under 35 U.S.C. 102(b), as both systems were on sale or in public use more than one year before the filing of the '065 patent. To the extent one or more claims of the '984 patent are entitled to claim priority to either or both provisional applications referenced in the '984 patent, XaCCT 2.0 and 2.1 are prior art to the '984 patent under at least 35 U.S.C. § 102(a), as both systems were used by others prior to the filing dates of the provisional applications.

89. The '510 patent was filed on February 15, 2005 as a continuation of the '984 patent and purports to claim priority to the same applications as the '984 patent.

90. Thus, XaCCT 2.0 and 2.1 are prior art to the '510 patent under 35 U.S.C. 102(b), as both systems were on sale or in public use more than one year before the filing of the '065 patent. To the extent one or more claims of the '510 patent are entitled to claim priority to either or both provisional applications referenced in the '510 patent,

XaCCT 2.0 and 2.1 are prior art to the '984 patent under at least 35 U.S.C. § 102(a), as both systems were used by others prior to the filing dates of the provisional applications

91. XaCCT 2.0 and 2.1 anticipate or render obvious the claims of the '065, '797, '510, and '984 patents. Accordingly, XaCCT 2.0 and 2.1 are material to the patentability of the '065, '797, '510, and '984 patents.

92. While later XaCCT systems (including, for example, XaCCT 3.0) were disclosed to the PTO during prosecution of the '065 patent and were at least disclosed during the prosecution of Patent Application No. 09/442,876, to which the '797, '510, and '984 patents claim priority, the earlier XaCCT systems were not disclosed during the prosecution of the '065, '797, '510, and '984 patents.

93. Mr. Givoly and Mr. Schweitzer were both employees of XaCCT Technologies, Ltd. and were thus unquestionably familiar with XaCCT 2.0 and/or 2.1.

94. If XaCCT 2.0 and/or 2.1 were disclosed to the PTO, one or more claims of the '065, '797, '510, and '984 patents would have been rejected by the patent examiner.

95. Based on the high materiality of XaCCT 2.0 and 2.1 to the '065, '797, '510, and '984 patents, it can be inferred that Mr. Givoly and Mr. Schweitzer, acting alone or in concert Mr. Zilka or other individuals associated with XaCCT or Amdocs that were substantively involved in the prosecution of the '065, '797, '510, and '984 patents, intentionally withheld these references from the PTO intending to deceive the patent examiner.

96. Intent to deceive also can be inferred based on the fact that XaCCT 3.0 was disclosed to the PTO, while XaCCT 2.0 and 2.1 were withheld.

97. For these same reasons, to the extent Mr. Givoly or Mr. Schweitzer disclosed XaCCT 2.0 and 2.1 to Mr. Zilka, but Mr. Zilka, either acting alone or in concert with Mr. Givoly, Mr. Schweitzer, and/or other individuals associated with XaCCT or Amdocs that were substantively involved in the prosecution of the '065, '797, '510, and '984 patents, elected to withhold these references, it can be inferred that Mr. Zilka, who was unquestionably familiar with XaCCT product offerings based on the fact that he prosecuted multiple patent applications for XaCCT and Amdocs, intended deceive the patent examiner by withholding these references.

98. The concealment of XaCCT 2.0 and 2.1 violated the duty to disclose material information under 37 C.F.R. § 1.56(c).

99. Because XaCCT 2.0 and 2.1 were concealed with intent to deceive the patent examiner, the 'the '065, '797, '510, and '984 patents are unenforceable for inequitable conduct.

OPENET'S PRAYER FOR RELIEF

WHEREFORE, Openet prays for the following relief:

A. that this Court adjudge and decree that Openet does not infringe any valid and enforceable claims of the '065, '797, '510, and '984 patents;

B. that this Court adjudge and decree that the claims of the '065, '797, '510, and '984 patents are invalid and/or unenforceable; and

C. that this case be declared exceptional pursuant to 35 U.S.C. § 285 and that this Court award Openet the fees and costs of this action, including reasonable attorneys' fees and litigation expenses; and that this Court order all such further relief it deems just and appropriate.

**IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION**

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff, v. OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation, Defendants.	)	Case No. 1:10-cv-910 (LMB/TRJ)

MEMORANDUM IN SUPPORT OF AMDOCS (ISRAEL) LIMITED'S MOTION FOR PROPOSED CLAIM CONSTRUCTIONS AND PARTIAL SUMMARY JUDGMENT OF NO INVALIDITY AND NO INEQUITABLE CONDUCT

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Case 1:10-cv-00910-LMB-TRJ Document 99 Filed 05/26/11 Page 5 of 26 PageID# 1331

limitation of the claims, summary judgment of no anticipation is warranted. Finally, Amdocs moves for summary judgment of no inequitable conduct because Openet has adduced no evidence of any intent by any Amdocs responsible person to deceive the United States Patent and Trademark Office ("USPTO").

II. Background of the Technology and the Patents-in-Suit

1. The Parties

Plaintiff Amdocs (Israel) Limited, the assignee and owner of the patents-in-suit, is an Israeli corporation and a subsidiary of Amdocs Limited (NYSE: DOX). Amdocs serves customers in more than 50 countries, including top-tier telecommunications providers AT&T, Sprint, T-Mobile, Bell Canada, BT Group, Telus, Vodaphone, and others. Amdocs' product offerings include the CES (Customer Experience Systems) portfolio of software products that enable service providers to track, account for, and bill for usage of network services such as Internet, email, SMS messaging, etc. Included among the CES portfolio are Amdocs' "mediation" products that enable network carriers to collect and process information relating to usage of networks. Amdocs' mediation products and the patents-in-suit originate from the development of mediation software products by a company called XaCCT Technologies, Inc. ("XaCCT"). XaCCT was formed in 1997 and was acquired by Amdocs in 2004.

Defendant Openet designs and sells software products, called FusionWorks, to telecommunications companies including AT&T, Sprint, Verizon, Time Warner Cable, and Cricket Communications. The accused FusionWorks products are built on what Openet calls the "Openet Framework" platform, and include the following products: FusionWorks Convergent Mediation; FusionWorks Convergent Charging; FusionWorks Network Edge Rating; FusionWorks Balance Manager; FusionWorks Policy Manager. With limited exceptions, Amdocs accuses Openet of infringement based on the offer for sale, sale, importation, and use of

the Openet core Framework software. Because all of Openet's products are based on the Framework platform, all of Openet's products are accused products in this case.

2. Amdocs' Patents-in-Suit

The patents-in-suit stem from development of mediation products at XaCCT in the 1997 time-frame, and relate generally to mediating accounting and billing records for services provided in networks that provide Internet services (*e.g.,* 3G and 4G networks).

a) Background of the Technology and the Nature of the Problem to Be Solved

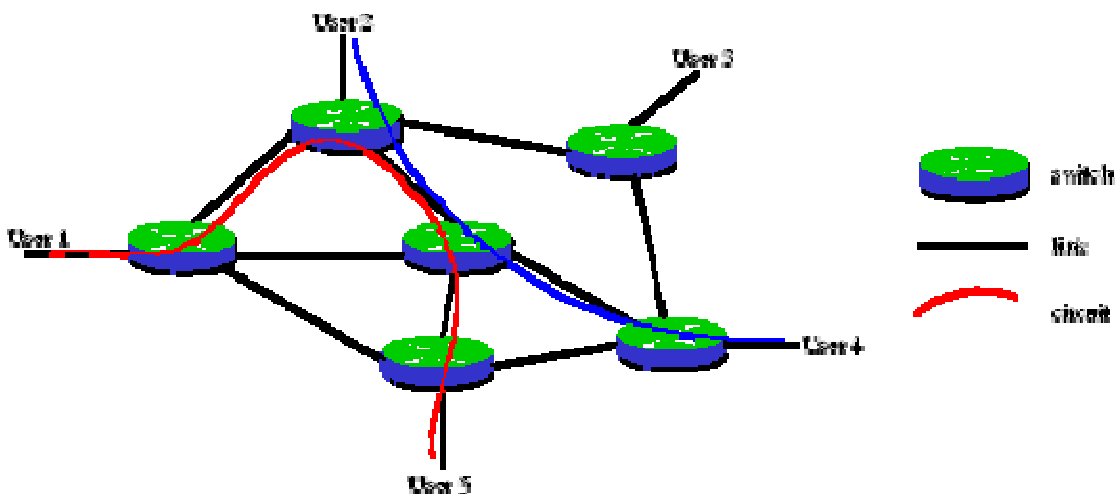
i) Traditional Telephone Communications Systems

Since at least the implementation of the telephone and telegraph, people have been able to communicate over long distances using a network, so long as there is an infrastructure to support communications and a service provider to provide services. This requirement has led to the creation of new companies, and indeed industries, to provide the infrastructure to support these services. For example, AT&T was the "carrier" that developed the initial infrastructure required to enable telephone communications. (*See* Zegura Decl. ¶ 5).

Telephone carriers such as AT&T did not provide their services for free. Further, they needed insight into the usage of their network to provide the proper infrastructure and deliver services efficiently. Accordingly, carriers developed a way to track a customer's usage of the network so that services could be delivered and the customer could be billed. (*Id.* at ¶ 6). Over time, a system was developed for telephony networks that captured each customer's usage in a digital record called a "Call Detail Record" ("CDR"). In practice, a CDR was created for each telephone call placed by a customer, and information such as the called party's telephone number, the calling party's telephone number, and the duration of the call were stored in CDRs. These CDRs would be collected and sent to a central location in batches where they would be

processed later to create a bill for customers. (*Id.*)

The traditional telephony CDR billing process was relatively simple. In particular, traditional telephone networks were "circuit-switched networks" where a dedicated communications channel called a "circuit" was set up between two land-line phones with fixed identifiers (i.e., the telephone numbers). The "circuit" would remain connected for the duration of the telephone call, and the call would be billed based on the duration, i.e., time from circuit-on (initial placement of the call) to circuit-off (end of call). An exemplary circuit-switched network is shown below:



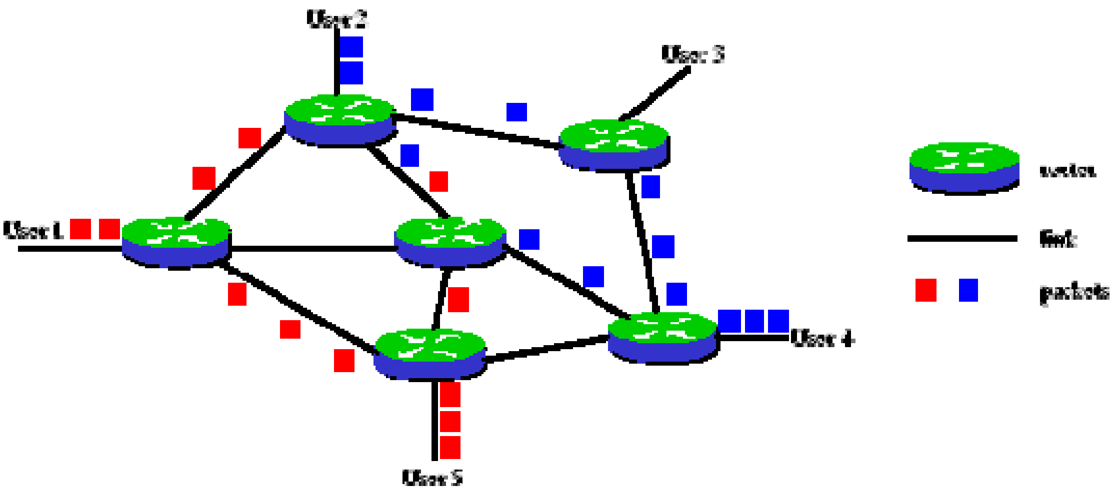
(*See* Zegura Decl. ¶ 7).

ii) The Internet

The advent of the Internet in the 1990s offered a new type of network to allow users to communicate. Unlike traditional "circuit-switched" telephony networks, however, the Internet is a "packet-based" network, and tracking usage on packet-based networks is vastly more complicated than circuit-switched networks. (*See* Zegura Decl. ¶¶ 12-16; Ex. A[1], '065 patent, at 1:62-2:11). In a packet-based network, no fixed path is used for data transfer, nor do users

[1] All cites to Exhibits refer to exhibits to the 5/26/2011 Declaration of Gregory H. Lantier in Support of Plaintiff Amdocs (Israel) Limited's Motion for Proposed Claim Constructions and Partial Summary Judgment of No Invalidity and No Inequitable Conduct.

always have a fixed identifier that uniquely identifies them. Instead, each end system is assigned an Internet Protocol ("IP") address, which may be temporary, and data is segmented into smaller parts which are transmitted as "packets," and sent over the network. The packets can be routed, combined or fragmented, in the same or different paths, as required to get them to their eventual destination. On the receiving end, the process is reversed – the data is read from the packets and re-assembled into the form of the original data. An exemplary packet-based network is shown below.



(*Id.*).

In a packet-based network, no circuit is set up prior to sending data between devices. Blocks of data, even from the same file or communication, may take any number of paths as they journey from one end to the other. (Zegura Decl. ¶ 13.) Further, packet-based networks such as the Internet typically employ a layered concept of networking to manage complexity and accommodate changes in technology. Layering is a way of sub-dividing the communications task into smaller parts, each with a defined functionality. (*See* Zegura Decl. ¶ 16).

Initially, Internet Service Providers ("ISPs") and Network Service Providers ("NSPs) billed users a flat rate for their Internet "dial-up" connectivity. However, that circuit-switched model soon became outdated given the packet-based nature of the Internet, and as Internet usage

exploded and users were provided new and different means (e.g., WiFi, cell-networks, Broadband, etc.) to connect. (*See* Zegura Decl. ¶ 10-11). Accordingly, by 1997, when Amdocs' predecessor company XaCCT was formed and the inventions contained in the patents-in-suit were conceived, developing new ways of tracking Internet transactions in order to account and bill for usage had become a paramount concern for network carriers and other Internet providers. (*Id.*; *see also* Ex. A, '065 Patent: 2:11-12 ("Therefore, what is desired is a system that allows for accounting and billing of transactions on [IP] based networks.").

b) The '065 Patent

U.S. Patent No. 7,631,065 issued from an application filed on December 7, 2001 as a continuation of U.S. Patent Application No. 09/442,876 (which later issued as U.S. Patent No. 6,418,467), which was in turn based on provisional applications filed on November 20, 1997 and November 19, 1998. (Ex. A, '065 Patent.) The claims of the '065 patent initially issued as claims in another patent applied for and obtained by Nortel Corporation (Ex. M, U.S. Patent No. 6,405,251). After the Nortel patent issued, Amdocs amended the claims of the '065 application and instigated an interference with Nortel in the USPTO to determine who had priority to the overlapping claims of Nortel's patent and Amdocs' '065 application. After Amdocs presented evidence of its prior invention, Nortel conceded that Amdocs had been first to invent what was claimed and that Amdocs had priority over Nortel. As a result, Nortel's patent was rescinded and, after further consideration by the USPTO, the '065 patent was subsequently allowed and issued to Amdocs. (*See* Ex. J, Excerpts from '065 Patent File History at AMDOCS0968596-637, and AMDOCS0968790-803; Ex. A, '065 patent.)

The '065 patent describes a system for collecting and processing network-related information in a packet-based network such as the Internet. Account records may be generated from the information collected and sent on for downstream uses such as billing. In addition,

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation,

Plaintiff,

v.

OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation,

Defendants.

Case No. 1:10cv910 (LMB/TRJ)

DECLARATION OF DR. ELLEN W. ZEGURA

Case: 15-1180 Document: 36 Page: 178 Filed: 05/06/2015

A. Introduction

1. I have been retained as an expert in this case by WilmerHale on behalf of Plaintiff Amdocs (Israel) Ltd. ("Amdocs"). I expect to testify at trial regarding Amdocs's assertions that Openet infringes the patents-in-suit and that the patents-in-suit are not invalid. A copy of my *curriculum vitae* is attached as Appendix A.

B. Person of Ordinary Skill in the Art

2. I have been informed and understand that factors that may be considered in determining the level of ordinary skill in the art include: (1) the educational level of the inventor, (2) type of problems encountered in the art, (3) prior art solutions to these problems, (4) rapidity with which innovations are made, (5) sophistication of the technology, and (6) educational level of active workers in the field.

3. In my opinion, based on the materials and information I have reviewed, and on my experience in the technical areas relevant to the patents-in-suit at about the time of the alleged invention described and claimed in these patents, the person of ordinary skill in the art would have had a Bachelor's degree in Electrical Engineering, Computer Science or a similar degree, with at least two years of experience in networking technology. Alternatively, a person of ordinary skill may have more education, *e.g.*, a Masters degree, but less work experience.

C. Background Technology

1. Communication Systems

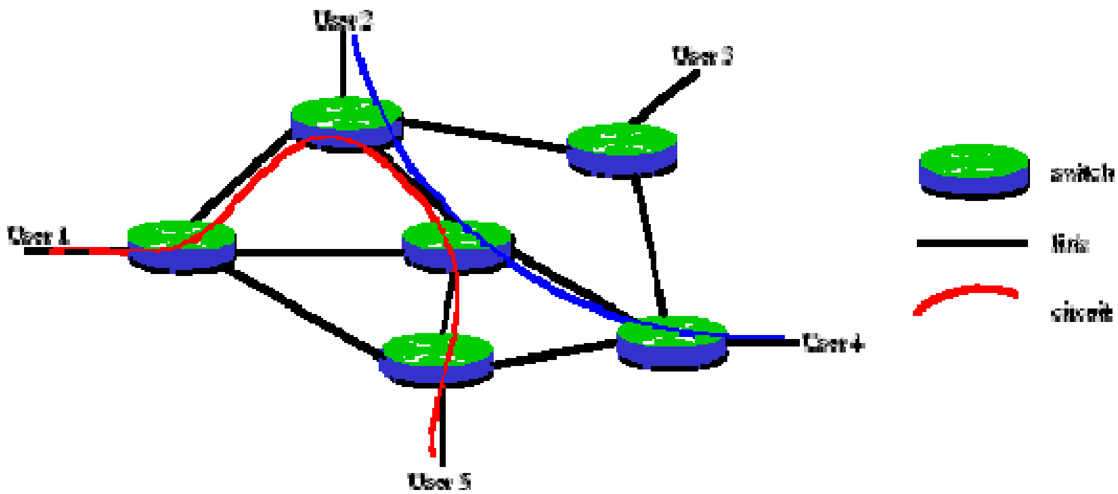
4. The patents-in-suit relate generally to the field of computer networks. In particular, the patents relate to accounting and billing for services provided in a computer network. (*See, e.g.*, '065 Patent Abstract).

5. People have been communicating over distances for a very long time, dating as far back as the use of smoke signals and drums to enable people to communicate across

distances. The invention of the telegraph and telephone made communication over distances much more convenient and effective. Each of these systems required some form of infrastructure to support communications. This in turn created an industry to provide the infrastructure to support these services. For example, AT&T was the "carrier" that developed the initial infrastructure required to enable telephone communications. They accomplished this by deploying a network of equipment, which evolved over time from electro-mechanical and other devices to sophisticated digital electronic and fiber optic equipment.

6. AT&T, like other for-profit businesses, did not provide telephone services for free. They developed a way to track a customer's usage of the AT&T network so the customer could be billed. Over time, a system was developed that captured each customer's usage in what became known as a "Call Detail Record" ("CDR"). In practice, a CDR was created for each telephone call placed by a customer, and information such as the called party's telephone number, the calling party's telephone number and the duration of the call were stored in CDRs. These CDRs would be collected and sent to a central location where they would be processed later to create a bill for customers.

7. The billing process was simplified because of the fundamental nature of the telephone network. In particular, the telephone network was a circuit-switched network where a connection called a "circuit" was set up between two devices and used for the duration of the communication. Information about the circuit was maintained by the network. The circuit may either be a fixed one that was always present, or it may be a circuit that was created on an as-needed basis. Even if many potential paths through intermediate devices existed between the two devices communicating, only one was used for any given dialog. An example circuit-switched network is shown below.



8. In the telephone system network, both the calling and the called party have fixed identifiers, *i.e.*, a telephone number that distinctly identifies them. When you call someone and they answer, you establish a circuit connection and can pass data between you, in a steady stream if desired. That circuit functions the same way regardless of how many intermediate devices are used to carry your voice. You use it for as long as you need it, and then terminate the circuit. The next time you call, you get a new circuit, which may (probably will) use different hardware than the first circuit did, depending on what is available at that time in the network. However, the telephone network could easily track usage because the connection and identifiers were fixed and could create the appropriate CDRs. Also, usage could be tracked to a particular user because each user had an established identifier, *i.e.*, a telephone number.

2. The Internet

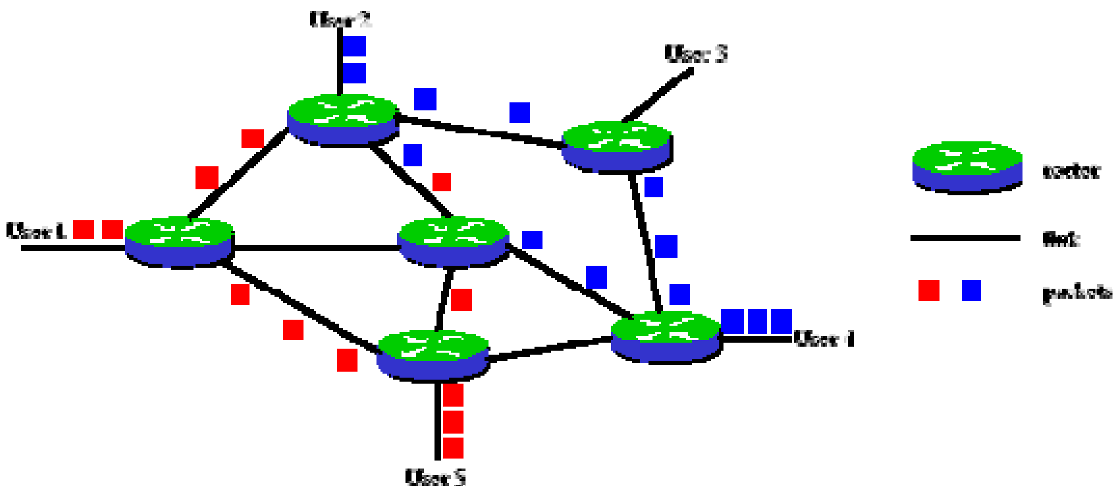
9. The Internet offered a new platform to allow users to communicate. The low cost of Internet connectivity and the wide range of services available were driving more people onto the Internet in the 1997 timeframe. This in turn created more of a burden on Network Service Providers ("NSPs") or Internet Service Providers ("ISPs") responsible for providing Internet access to provide more access and more services or applications.

10. Initially, ISPs and NSPs billed users a flat rate for Internet connectivity. This approach made sense for consumers. But the model did not make the same sense for business customers as their usage was typically higher and involved services and a quality of service that consumers did not require. ISPs and NSPs may have wanted to account for session logging, bandwidth usage, directory data and application session information from a variety of sources.

11. However, the problem providers faced tracking data network usage was far from trivial due to the wide variety of network resources that were available to users, the type of usage information they provided, the ephemeral nature of the connections, and the nature of communications on computer networks. Unlike traditional circuit-switched telephony networks where each user had a fixed identifier as an entry point to the network (a telephone number) and a connection was made between a calling party and a called party until one of the parties hung up, Internet usage was difficult to track due to the inherent nature of Internet packet-switched communications and Internet protocols as explained below.

a. Packet-Switched Networks

12. In a packet-switched network, no fixed path is used for data transfer nor do users always have a fixed identifier that uniquely identifies them. Instead, each end system is assigned an Internet Protocol ("IP") address, and data is segmented into smaller parts called packets and sent over the network. The packets can be routed, combined or fragmented, in the same or different paths, as required to get them to their eventual destination. On the receiving end, the process is reversed—the data is read from the packets and re-assembled into the form of the original data. An example packet-switched network is shown below.



13. In a packet-switched network, no circuit is set up prior to sending data between devices. Blocks of data, even from the same file or communication, may take any number of paths as they journey from one end to the other.

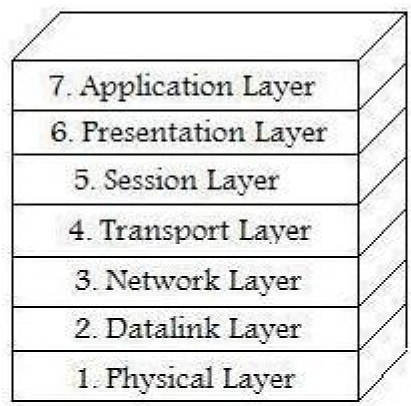
14. Unlike circuit switching, packet switching does not require the establishment of circuits prior to transmission of data and the termination of circuits after the transmission of data. The switches, called routers, have to make a lookup in the forwarding table for each incoming packet. A forwarding table contains a mapping between the possible final destinations of packets and the outgoing link on their path to the destination. Forwarding tables can be very large because they are indexed by possible destinations (or groups of destinations), making lookups and forwarding decisions computationally complex. Each packet carries the address of the destination host and uses the destination address to make a forwarding decision. Consequently, routers do not need to modify the destination addresses of packets when forwarding packets.

15. Since each packet is processed individually by a router, all packets sent by a host to another host are not guaranteed to use the same physical links. If the routing algorithm decides to change the forwarding tables of the network between the time instants two packets are sent, then these packets will take different paths and can even arrive out of order.

16. Moreover, packet-switched networks such as the Internet typically employ a layered concept of networking, which was developed to manage complexity and accommodate changes in technology. Layering is a way of sub-dividing a communications task into smaller parts, each with a defined functionality. A layer is a collection of functions that provide services to the layer above it and receive services from the layer below it. For example, a layer that provides end-to-end packet delivery provides that service to the layer above (which might, for example, add functionality to make end-to-end packet delivery reliable), and uses the layer below to accomplish its task (for example, using a link layer service that moves a packet from one router to the next). Each layer of the network model is generally responsible for a different network function. Each layer typically passes information up and down to the next subsequent layer as data is processed. And importantly, each layer may contain information regarding usage that a service provider would need to track for billing purposes.

b. The OSI Network Model

17. The OSI network reference model is one standard approach to network layering. The OSI network model layers are arranged from the lower levels starting with the physical (hardware) to the higher levels. Below is a graphical representation of the OSI model followed by an explanation of each layer.



OSI Refrence Model

18. The lowest layer, layer 1, is the "physical layer." The physical layer defines the copper or optical fiber cable or other physical medium that is responsible for carrying signals. All media are functionally equivalent in that they can carry bits between locations on the media. The main difference is in convenience and cost of installation and maintenance. Converters from one media to another operate at this level.

19. The next layer up is the "data link layer," which defines the format of data on the medium. A link layer data frame may include checksum, local source and destination address, and data. The data link layer handles the physical and logical connections to the packet's destination, using a network interface.

20. The next layer up is the "network layer." This is where the Internet Protocol ("IP") network protocol resides. It routes packets from end-to-end in a best-effort fashion using the best path available in the network.

21. The layer above the network layer is the "transport layer," which includes transport protocols such as Transport Control Protocol ("TCP") and User Datagram Protocol ("UDP"). This layer provides end-to-end delivery of segments and may, depending on the protocol, also ensure properly sequenced and error free transmission.

22. The next layer up is the "session layer." This is the user's interface to the network. It determines when the session is begun or opened, how long it is used, and when it is closed. It controls the transmission of data during the session. It supports security and name lookup enabling computers to locate each other.

23. The next layer up is the "presentation layer." This layer is responsible for the delivery and formatting of information to the application layer for further processing or display. It relieves the application layer of concern regarding syntactical differences in data representation within the end-user systems. It is used to translate data to a computer specific format such as byte ordering. It may include compression. It prepares the data, either for the network or the application depending on the direction it is going.

24. The top layer of the OSI model is the "application layer," which provides services software applications need. It also provides the ability for user applications to interact with the network.

c. TCP/IP

25. IP is the communication protocol for communication between computers on the Internet. IP ("Internet Protocol") defines the system for addresses that allows electronic devices (like computers) to be connected to the Internet. IP also defines the format used for packets and the best-effort service that delivers packets from one end to the other.

26. TCP ("Transmission Control Protocol") is commonly used with IP to provide reliable end-to-end delivery. Because of their frequent use together, the phrase "TCP/IP" is often used to describe the core Internet protocols. An alternative to TCP, UDP ("User Datagram Protocol") is also compatible with IP and provides unreliable end-to-end transport.

27. In the TCP/IP model of the Internet, not all layers of the OSI stack are differentiated. Instead, the Internet can reasonably be described as a five layer stack, including

the physical layer, the link/medium access control layer, the network layer (IP), the transport layer (often TCP and sometimes UDP), and the application layer. *See* the figure below, which appears on page 51 of Kurose and Ross, *Computer Networking A Top Down Approach*, Fifth Edition (2010).

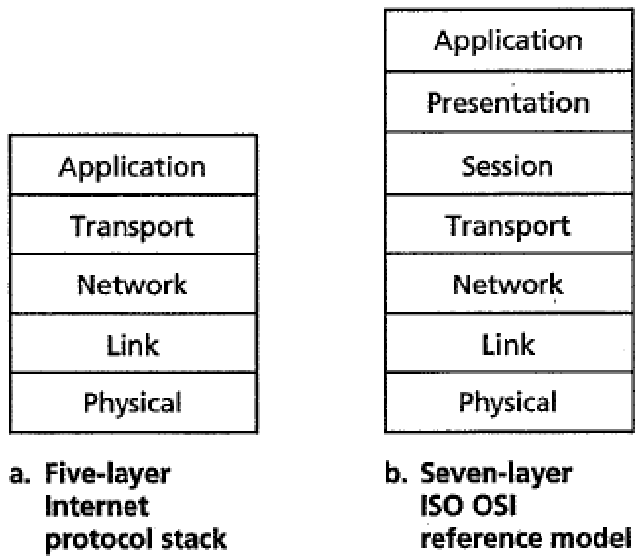


Figure 1.23 ♦ The Internet protocol stack (a) and OSI reference model (b)

28. IP is a “connection-less” communication protocol. It does not reserve the communication line(s) between computers. To the contrary, it helps support sharing of network lines since each line can be used for communication between many different computers at the same time via time-sharing. With IP, messages are broken up into small independent “packets” and sent between computers via the Internet. IP is responsible for “routing” each packet to the correct destination.

29. When an IP packet is sent from a computer, it arrives at an IP router. The IP router is responsible for “routing” the packet to the correct destination by looking up the next hop in the forwarding table. If the destination has been reached, the packet will be sent up the stack; if not, the packet will be sent to the next hop router. The path the packet will follow might

be different from other packets of the same communication, if the routing and forwarding has changed. The router is responsible for identifying the next hop, depending on factors such as traffic volume, link failures or restorations in the network, or other parameters.

30. Each computer must have an IP address before it can connect to the Internet. IP addresses consist of four numbers, each in the range 0 to 255, and commonly written in "dotted quad notation" that separates each number by periods, for example "64.17.143.84." One can think of an IP address as a phone number on the Internet. Just like it would be problematic to have two different houses with the same phone number, it would be problematic to have two different machines (more properly known as hosts) that have the same IP address on the Internet because there would be no way to insure proper communications. Thus, IP addresses must be unique.

31. Each IP packet must have a source address before it can be sent to another computer. However, not all computers have fixed IP addresses. Instead, in some cases, computers are assigned a temporary IP address from a pool of IP addresses available to a service provider, thus the assigned IP address may be different from one period of use to the next.

32. When one computer wants to communicate with another computer, it must know the destination address of the other computer. Most users do not know or memorize IP addresses. Instead, users typically use more human-friendly domain names, *e.g.*, www.amdocs.com. When addressing a web site, like http://www.amdocs.com, the name is translated to a number (an IP address) by a Domain Name Server (DNS). DNS servers are distributed all over the world and connected to the Internet to provide this critical translation service. DNS servers are responsible for translating domain names into IP addresses. They

handle this translation for web sites, email, FTP servers, database servers, or any machine with a domain name.

33. Different components of the network track and store information regarding the data packets traversing the network. This information, however, was not standardized. For example, a router could compile many bytes of statistical information for a single packet as it passed through the router, making it difficult to easily identify and discern usage for a particular user.

D. Claim Construction

1. "Record" ('065 Patent: Claims 1, 4, 7, 13, 17; '797 Patent: Claims 1, 2, 7, 8, 19; '510 Patent: Claim 16; '984 Patent: Claims 1, 13)

Amdocs's Proposed Construction	Openet's Proposed Construction
one or more fields of data treated as a unit	an ordered set of fields representing separate data items

34. It is my opinion that a person of ordinary skill in the art would understand the term "record" to mean "one or more fields of data treated as a unit." My opinion is based on my review of the patents-in-suit, the file histories of these patents, the prior art, and what I consider to be the plain meaning of the term.

35. At a high level, the patents-in-suit relate to the generation of meaningful information from incomplete data elements available on a network. For instance, as described in the patents, "[t]he system transforms raw transaction data from network devices into useful billing *records* though policy-based filtering, aggregation, and merging." ('065 Patent at col. 3:40-42 (emphasis added)). Thus, according to the patents-in-suit, network data is made useful by being transformed into records.

36. The plain and ordinary meaning of "record" as set forth in dictionary definitions that I have reviewed supports my understanding of the term as set forth above. (*See, e.g.*, *Microsoft Computer Dictionary*, 4th Ed., 1999, p. 376 ("[a] data structure that is a collection of fields (elements), each with its own name and type"); *Merriam-Webster's Ninth New Collegiate Dictionary*, 1988, p. 984 ("a collection of related items of information (as in a database) treated as a unit")). The plain meaning therefore reflects that records are structured units of meaningful data. A person of ordinary skill in the art would understand that in the context of the patent, the data is organized into fields. Accordingly, records are one or more fields of data, organized into fields.

2. "Network Accounting Record" ('065 Patent: Claims 1, 4, 7)

Amdocs's Proposed Construction	Openet's Proposed Construction
a record reflecting one or more transactions on an IP and/or packet-based network	a record that accounts for network usage

37. It is my opinion that a person of ordinary skill in the art would understand the term "network accounting record" to mean "a record reflecting one or more transactions on an IP and/or packet-based network." My opinion is based on my review of the patents-in-suit, the file histories of these patents, the prior art, and what I consider to be the plain meaning of the term.

38. The patents-in-suit at a high level relate to the generation of meaningful records from the incomplete data which may be collected from disparate sources on a network. Transaction data for an IP network presents unique difficulties which the disclosed systems and methods of the '065 patent are designed to address. (*See, e.g.*, '065 Patent at col. 2:8-21.) For example, the system of Figure 1 of the '065 patent (reproduced below) allows network service

providers, or NSPs, to account and bill for IP network communications. (*See, e.g.*, '065 Patent at col. 4:29-31).

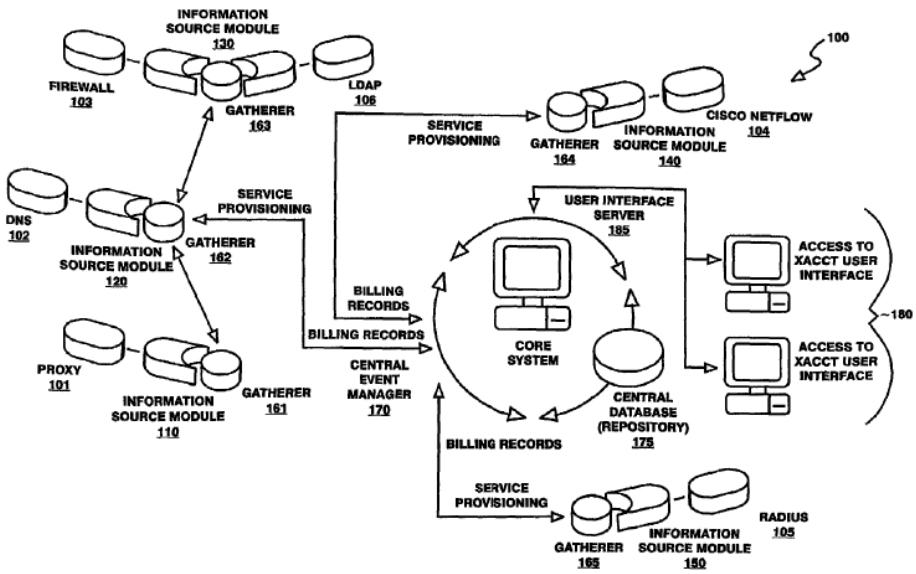


FIG. 1

39. Records in the system shown in the figure above include "network accounting records." One of ordinary skill in the art would understand the term "accounting" to mean "related to a transaction," as I have explained above. It follows that one of ordinary skill in the art would therefore understand the term "network accounting record" to mean "a record reflecting one or more transactions on an IP and/or packet-based network."

40. From the Abstract, through the Background of the Invention, through the rest of the Specification, the patentees made clear that the invention was directed towards inventions on specific types of networks, *i.e.*, IP and/or packet based. For example, the Background describes the differences between IP networks, which are packet-based and extremely complex, and the older voice-networks, which were simpler circuit-switch based, concluding that "what is desired is a system and method that track IP network usage information across multiple layers of the OSI

network model." ('065 Patent, Col. 2:19-21). The bulk of the specification describes the invention in terms of a preferred embodiment for IP networks. The specification does note that the invention is applicable to "non-IP networks….What is important is that some sort of processing and storing capability is available at the gatherers, the CEM's, the databases and the user interface servers." ('065 Patent, Col. 15:18-27). A person of ordinary skill in the art would recognize that gatherers, CEM's, databases and user interface servers of the type described would be applicable to packet-based networks even if non-IP. Accordingly, a person of ordinary skill in the art would understand "network accounting records" to be records reflecting one or more transactions on an IP and/or packet-based network.

3. "First Source" and "Second Source" ('065 Patent: Claims 1, 7)

Amdocs's Proposed Construction	Openet's Proposed Construction
first source: a source of network information second source: a source of network information of a different type than the information from the first source	two distinct sources, located in different locations of a network, of network accounting information

41. It is my opinion that a person of ordinary skill in the art would understand the term "first source" to mean "a source of network information" and the term "second source" to mean "a source of network information of a different type than the information from the first source." My opinion is based on my review of the patents-in-suit, the file histories of these patents, the prior art, and what I consider to be the plain meaning of the terms.

42. As the "Background of the Invention" section of the '065 patent explains, trying to account for transactions on IP networks presented a unique set of challenges: "The problem is even more difficult in IP network traffic because the information sources can exist and [sic, on] many different levels of the OSI network model, throughout heterogeneous networks. Potential

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sources of information include packet use from routers, firewall authentication logging, email data, ISP session logging, and application layer use information." ('065 Patent at col. 2:13-18). These sources provided different types of information, resulting in the challenges set forth in the '065 patent. The systems and methods of the '065 patent advantageously allow for data to be collected from any number of information sources in an IP network. (*See, e.g.*, '065 Patent at col. 5:13-16, 33-35).

43. In view of this, one of ordinary skill in the art would understand the "first source" and "second source" of the '065 patent claims to respectively mean "a source of network information" and "a source of network information of a different type than the information from the first source." Correlating information from these first and second sources requires the ability to understand different types of network information, which is an explicit advantage of the '065 patent. (*See id.*).

4. "plurality of layers" ('510 patent: Claim 16; '984 patent: Claims 1, 13)

Amdocs' Proposed Construction	Openet's Proposed Construction
More than one layer of the OSI network model	Multiple levels in a network

44. It is my opinion that the meaning to a person of ordinary skill in the art, as used in claim 16 of the '510 patent and claims 1 and 13 of the '984 patent, is "more than one layer of the OSI network model." My opinion is based on my review of the patents-in-suit, the file histories of these patents, and the prior art.

45. The phrase "plurality of layers" as used in the claims makes it plain that the recited layers refer to network layers. (*See, e.g.*, '510 patent, 4:3-5).

46. The specification confirms that the claimed "plurality of layers" refers to network layers. (*See, e.g.*, '510 patent, 2:23-25 ("Therefore, what is desired is a system and method that

track IP network usage information across multiple layers of the OSI network model.") and '510 patent, 4:3-5 ("Data collection can be from a wide range of network devices and services, spanning all layers of the network – from the physical layer to the application layer.")).

5. "Filtering" ('510 patent: Claim 16; '984 patent: Claim 1, 13)

Amdocs's Proposed Construction	Openet's Proposed Construction
Discarding unneeded information	Plain and ordinary meaning, or if construed, filtering means processing or discarding information.

47. It is my opinion that the meaning of "filtering" to a person of ordinary skill in the art, as used in claim 16 of the '510 patent and claims 1 and 13 of the '984 patent, is "discarding unneeded information." My opinion is based on my review of the patents-in-suit, the file histories of these patents, the prior art, and what I consider to be the plain meaning of the term.

48. Filtering is a well known in the art. For example, *Merriam-Webster Dictionary* defines the term as "to remove by means of a filter." (*See, e.g.*, *Merriam-Webster's Ninth New Collegiate Dictionary*, 1988, p. 463). This comports with Amdocs' proposed construction. The terms usage in the claims is completely consistent.

49. The specification confirms the plain meaning of "filtering" and demonstrates that the claimed "filtering" means discarding unneeded information. (*See, e.g.*, '510 patent, 7:18-21 ("Filtering means discarding any record that belongs to a group of unneeded data records. Data records are unneeded if they are known to be collected elsewhere. A policy framework enables the NSP to configure what to collect where.").

6. "Aggregating" ('510 patent: Claim 16; '984 patent: Claim 1, 13) "Aggregation" ('065 patent: Claim 17)

Amdocs's Proposed Construction	Openet's Proposed Construction

Amdocs's Proposed Construction	Openet's Proposed Construction
Accumulating/Accumulation	This claim term is indefinite. To the extent it is amenable to construction, it refers to accumulating groups of data record flows and generating a single data record for each group.

50. The meaning of "aggregating" and "aggregation" to a person of ordinary skill in the art, as used in claim 16 of the '510 patent and claims 1 and 13 of the '984 patent, is "accumulating" or "accumulation." My opinion is based on my review of the patents-in-suit, the file histories of these patents, the prior art, what I consider to be the plain meaning of the term, and is based on the same reasoning I already provided above for the claim term "aggregation" in the '065 patent, which I incorporate here.

51. The term "aggregation" is a well known term in the art and in everyday language. Its common meaning is to collect or gather into a mass or whole. (*See, e.g.*, *Merriam-Webster's Ninth New Collegiate Dictionary*, 1988, p. 64 ("the collecting of units or parts into a mass or whole")). It is further clear what the term means in the context of the asserted claims. For example, the term appears in the body of claim 17 of the '065 patent ("the module receives the records produced by the plurality of data collectors for aggregation purposes"). The term in this context refers to the accumulation of records.

7. "Report" ('510 patent: Claims 16, 17; '984 patent: Claims 1, 2, 13)

Amdocs's Proposed Construction	Openet's Proposed Construction
a query to a database and/or the result of such a query	Plain and ordinary meaning

52. It is my opinion that the meaning of "report" to a person of ordinary skill in the art, as used in claims 16 and 17 of the '510 patent and claims 1, 2 and 13 of the '984 patent, is "a

query to a database and/or the result of such a query." My opinion is based on my review of the patents-in-suit, the file histories of these patents, the prior art, and what I consider to be the plain meaning of the term.

53. Claim 16 of the '510 patent recites "report" in the body of the claim, *e.g.*, ("computer code for submitting queries to the database utilizing predetermined reports for retrieving information on the collection of the network usage information from the network devices" and "computer code for outputting a report based on the queries").

54. Claim 1 of the '984 patent recites "report" in the body of the claim, *e.g.*, ("allowing the selection of one of a plurality of reports for reporting purposes," "submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices" and "outputting a report based on the queries."). The term appears in similar fashion in claim 13.

55. The claim language makes plain that the term report means a query or the result of a query. For example, predetermined reports are used to form the queries in claim 16 of the '510 patent. Similarly, selected reports are used to form queries and reports are output based on the queries in claims 1 and 13 of the '984 patent.

56. The specification confirms the meaning of "report." Specifically, the specification confirms that the term "report" refers to a query to a database and/or the result of such a query. (*See, e.g.*, '510 patent, 7:40-47 ("This can be used for example in order to achieve a business-hybrid filtering and aggregation data reduction by imposing the business rules or the usage-based products that are offered to the customer, onto the record flows as they are collected in real-time. This is done instead of previous system where, the information is stored in a database and then database operations are performed in order to create bills or reports.")).

E. Priority Date of the '065 Patent

57. I understand that for the purposes of this case Amdocs is relying upon November 20, 1997 as the priority date for the asserted claims of the '065 patent. It is my opinion that the priority provisional application for the '065 patent supports the asserted claims for that patent.

58. Specifically, it is my opinion that U.S. Provisional Patent Application No. 60/066,898 (the '898 provisional application), filed on November 20, 1997, supports all of the asserted claims of the '065 patent. Among other features, the '898 provisional application discloses receiving accounting records from sources (*see, e.g.*, AMDOCS0630542-47; AMDOCS0630549; AMDOCS0630553-54; AMDOCS0630561), correlating the records (*see, e.g.*, AMDOCS0630543; AMDOCS0630550-51), and enhancing the records (*see, e.g.*, AMDOCS0630543; AMDOCS0630550-52; AMDOCS0630562.) Attached as Appendix B to this report is a chart that provides additional citations for the asserted claims of the '065 patent.

F. Disclosures in the Prior Art

1. U.S. Patent No. 5,712,908

59. The '908 patent is entitled "Apparatus And Method For Generating Call Duration Billing Records Utilizing ISUP Messages In The CCS/SS7 Telecommunications Network." It is directed to determining the time duration of a call and providing data that can be utilized to determine the appropriate entity to bill for the elapsed time of the call. (*See* '908 patent, Col. 3:54-56.) An Initial Address Message ("IAM") that sets up a call is correlated with subsequent Message Signal Units ("MSU") for the call that include an Integrated Service Digital Network User Part ("ISUP"). (*See* '908 patent, Col. 3:56-58.) The information in the IAM and correlated subsequent MSUs, together with the times of arrival, provide the elapsed time for the call and the data for identifying the appropriate entity to bill. (*See* '908 patent, Col. 3:58-61.)

This information is utilized to generate a billing record for the call. (*See* '908 patent, Col. 3:61-62.)

60. In my opinion, the '908 patent does not disclose "computer code for receiving from a first source a first network accounting record." The '908 patent relates only to telephony networks. Therefore, the citations in Dr. Shamos's charts, as well as the remainder of the '908 patent, fail to show receiving network accounting records from a source, as these are records reflecting one or more transactions on an IP and/or packet-based network. (*See* Dr. Shamos Report, Exhibit 3B.) Furthermore, the '908 patent also fails to show more than one source of data, as all of the sources in the '908 patent provide data of the same type, *i.e.*, call billing records. (*See, e.g.*, '908 patent, Figure 4.) Dr. Shamos's report fails to show anything other than these call billing records, as does the remainder of the '908 patent. (*See* Dr. Shamos Report, Exhibit 3B.) The '908 patent therefore does not disclose computer code for receiving from a first source a first network accounting record.

61. In my opinion, the '908 patent does not disclose "computer code for correlating the first network accounting record with accounting information available from a second source." As explained above, the '908 patent fails to show more than one source of data, as all of the sources in the '908 patent provide data of the same type, *i.e.*, call billing records. (*See, e.g.*, 908 patent, Figure 4.) Dr. Shamos's report fails to show anything other than these call billing records, as does the remainder of the '908 patent. (*See* Dr. Shamos Report, Exhibit 3B.)

2. U.S. Patent No. 5,732,128

62. The '128 patent is entitled "Method and Apparatus for Storing Call Feature Data." It is directed to a method for assembling a call record. (*See* '128 patent, Col. 2:16.) The method of the '128 patent includes originating a call from a calling station to a terminating station by connecting to an originating telecommunication switch. (*See* '128 patent, Col. 2:17-19.) An

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originating call record is opened by storing data regarding a calling station directory number, a date of the call, a start time of the call, a call setup feature activation, a call setup result, and a terminating station directory number. (*See* '128 patent, Col. 2:19-23.) If a subsequent call feature is activated before the call ends, the method stores a feature type, a feature result for the subsequent feature, and any directory number related to the subsequent feature to the end of the call record. (*See* '128 patent, Col. 2:23-27.) At the end of the call, the originating call record is stored in the originating telecommunication switch. (*See* '128 patent, Col. 2:30-31.)

63. The method of the '128 patent also includes receiving the call from the calling station for a terminating station and opening a terminating call record by storing data regarding the calling station directory number, the date of the call, the start time of the call, the call setup feature activation, the call setup result, and the terminating station directory number. (*See* '128 patent, Col. 2:31-37.) If a subsequent call feature has been activated before the call ends, the method stores a feature type, a feature result for the subsequent feature, and any directory number related to the subsequent feature to the end of the call record. (*See* '128 patent, Col. 2:38-42.) At the end of the call, the method of the '128 patent stores the call record in the terminating telecommunication switch. (*See* '128 patent, Col. 2:44-46.) The originating call record and the terminating call record are then communicated to a data analysis system where they are combined into a single record and analyzed with similar call records of this directory number to determine how the call feature customer may obtain better call service. (*See* '128 patent, Col. 2:46-50.) Figure 1 of the '128 patent illustrates a telecommunications system for practicing the method of the '128 patent. (*See* '128 patent, Col. 2:53-54.)

64. In my opinion, the '128 patent does not disclose "code for receiving from a first source a first network accounting record." As an initial matter, Dr. Shamos's report makes no

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mention of computer code; it simply provides a citation to a portion of the ‘128 patent that also fails to mention this. (*See* Dr. Shamos Report, Exhibit 3B.) Furthermore, and as explained above, the ‘128 patent relates only to telephony networks. Therefore, the citations in Dr. Shamos's charts, as well as the remainder of the ‘128 patent, fail to show receiving network accounting records from a source, as these are records reflecting one or more transactions on an IP and/or packet-based network. (*See* Dr. Shamos Report, Exhibit 3B.)

65. Furthermore, the ‘128 patent also fails to show more than one source of data, as the various entities in the ‘128 patent all provide data of the same type, *i.e.*, call activity information. (*See, e.g.*, ‘128 patent, Figure 2.) Figure 2 of the ‘128 patent (reproduced below) illustrates in step 204 what is recorded in a call activity record. Dr. Shamos's report fails to show anything other than these call activity records, as does the remainder of the ‘128 patent. (*See* Dr. Shamos Report, Exhibit 3B.) The ‘128 patent therefore does not disclose computer code for receiving from a first source a first network accounting record.

66. In my opinion, the ‘128 patent does not disclose "computer code for correlating the first network accounting record with accounting information available from a second source." As explained above, the ‘128 patent fails to show more than one source of data, as the various entities in the ‘128 patent provide data of the same type, *i.e.*, call activity information. (*See, e.g.*, ‘128 patent, Figure 2.) Dr. Shamos's report fails to show anything other than these call activity records, as does the remainder of the ‘128 patent. (*See* Dr. Shamos Report, Exhibit 3B.)

3. U.S. Patent No. 5,784,443

67. The ‘443 patent is entitled "Integrated Revenue Domain for Telecommunication Networks." It is directed to a telecommunications network which provides means to compile and correlate all usage records created by a specific call as it is transmitted through a

communications network. (*See* '443 patent, Col. 1:54-57.) The '443 patent compiles and correlates usage records by assigning a unique identifier to each call within a communications network and propagating the identification to all network resources used within the call. (*See* '443 patent, Col. 1:57-61.) The compilation and correlation of records is accomplished within a short time after the termination of the call event. (*See* '443 patent, Col. 1:61-62.) The compiled resource-usage records are translated into a record that may be centrally archived by the '443 system and that accurately reflects customers' usage of network resources. (*See* '443 patent, Col. 1:63-65.) The record may then be accessed by further systems, such as billing and network traffic control. (*See* '443 patent, Col. 1:65-67.)

68. In my opinion, the '443 patent does not disclose "computer code for receiving from a first source a first network accounting record. The '443 patent relates only to telephony networks. Therefore, the citations in Dr. Shamos's charts, as well as the remainder of the '443 patent, fail to show receiving network accounting records from an IP and/or packet-based network. (*See* Dr. Shamos Report, Exhibit 3B.).

69. In my opinion, the '443 patent does not disclose "computer code for correlating the first network accounting record with accounting information available from a second source." As an initial matter, Dr. Shamos's report fails to show what the alleged "sources" of the '443 patent would even be, as the citations in his report refer to record creation, and not receiving. (*See id.*) Nonetheless, the '443 patent fails to show more than one source of data, as the switches in the '443 patent provide data of the same type, *i.e.*, call records. (*See, e.g.*, '443 patent, Col 2:50-58.) Dr. Shamos's report fails to show anything other than these call records, as does the remainder of the '443 patent. (*See* Dr. Shamos Report, Exhibit 3B.)

4. U.S. Patent No. 6,085,243

70. The ‘243 patent is entitled “Distributed Remote Management (DRMON) For Networks.” It is directed to a distributed remote network monitor in a local area network (“LAN”). (*See* ‘243 patent, Col. 5:65-66.) The monitor described included dRMON agents that are placed within each end system (ES) within the LAN and that implement prior art RMON functional groups but only capture and analyze packets that their native ES sends or receives. (*See* ‘243 patent, Col. 5:67 - 6:6.) On a regular, periodic basis the dRMON agents forward their statistics and/or captured packets to a dRMON proxy or collector, existing somewhere on the WAN/LAN. (*See* ‘243 patent, Col. 6:10-13.) The proxy combines received agent data in a database. (*See* ‘243 patent, Col. 6:13 and Col. 8:45-49.) The proxy then makes this information available to management applications, either using SNMP and the MIB-II and RMON MIBs or optionally, to WEB browsers via HTTP. (*See* ‘243 patent, Col. 8:49-52.) Users can use the database query and reporting tools they use every day to also access and analyze their network management data. (*See* ‘243 patent, Col. 13:15-18.)

71. In my opinion, the ‘243 patent does not disclose “computer code for completing a plurality of data records.” Dr. McDaniel contends that the ‘243 patent “describes how data records can be completed by correlating the collected information.” (*See* Dr. McDaniel Report, Appendix B, p. 46.) However, the ‘243 patent quotations he provides do not provide support for the assertion that data records are completed. The quotes mention merging, but the simple act of merging in and of itself does not complete data records.

5. U.S. Patent No. 5,787,253

72. The ‘253 patent is entitled “Apparatus And Method Of Analyzing Internet Activity.” The ‘253 patent describes an internet activity analyzer that includes a network interface controller, a packet capturing module, a packet analysis module, and a data

management module. (*See* ‘253 patent, Col. 2:11-13.) The network interface controller is connected to a transmission medium to receive the stream of data packets transmitted over the medium. (*See* ‘253 patent, Col. 2:13-16.) The packet capturing module filters the packet stream to remove undesired packet data and passes the raw packet data to a raw packet data buffer. (*See* ‘253 patent, Col. 2:16-20.) The raw packet data is decoded at the internet protocol layer to provide information regarding the packet. (*See* ‘253 patent, Col. 2:20-22.) After decoding, a plurality of packets from a plurality of exchanges between a plurality of nodes may be recompiled into proper order using the administrative data to provide concatenated raw transaction data which may be coherently stored in a raw transaction data buffer. (*See* ‘253 patent, Col. 2:24-29.) The data in the raw transaction data buffer may be sorted and filtered by the user to organize and eliminate undesired data. (*See* ‘253 patent, Col. 2:32-34.) An application level protocol translator translates the raw transaction data and stores the data in a translated transaction data buffer. (*See* ‘253 patent, Col. 2:34-36.) The translated data provides high level information regarding the transactions between nodes which is used to monitor or compile statistics regarding network or internetwork activity. (*See* ‘253 patent, Col. 2:36-39.) The data management module includes a logical unit to provide calculated information and an inference analyzer to provide data inferred from the data in the data buffers. (*See* ‘253 patent, Col. 2:43-46.)

73. In my opinion, the ‘253 patent does not disclose “computer code for completing a plurality of data records.” None of the quotations from the ‘253 patent establish that data records are completed. (*See* Dr. McDaniel Report, Appendix B, pp. 52-53.) They simply refer to sorting, segregating and deriving information, and not completing data records.

6. U.S. Patent No. 5,958,010

74. The '010 patent is entitled "Systems And Methods For Monitoring Distributed Applications Including An Interface Running In An Operating System Kernel." The '010 patent describes automated monitoring and management of distributed applications, client/server databases, networks and systems, including those that operate across heterogeneous environments. (*See* '010 patent, Col. 3:9-13.) The '010 patent describes distributed, automated, intelligent monitoring agents with embedded sensing technology knowledgeable of application protocols to continuously monitor the network environment in real time. (*See* '010 patent, Col. 3:13-16.) The monitoring agents can be located on each client and server in the network. (*See* '010 patent, Col. 3:16-18.) The monitoring agent couples to the network communications stack and monitors the data that is being passed between the client and the network, and between the server and the network. (*See* '010 patent, Col. 3:16-21.) By coupling into the communications stack, the agent can monitor all data being passed to any process running on the client. (*See* '010 patent, Col. 3:21-23.) The agent can store all the collected data in a database. (*See* '010 patent, Col. 3:26-27.)

75. In my opinion, the '010 patent does not disclose "computer code for completing a plurality of data records." Dr. McDaniel cites to several passages in the '010 patent to support his assertion that the '010 patent discloses this claim limitation. (*See* Dr. McDaniel Report, Appendix B, p. 60.) However, these passages describe how an agent can send events to "correlate" data for display. This does not disclose completing a plurality of data records from the filtered and aggregated network communications usage information as recited.

Dated: May 26, 2011

Dr. Ellen W. Zegura

APPENDIX A

Ellen W. Zegura
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EDUCATIONAL BACKGROUND

D.Sc.	1993	Washington University	Computer Science
M.S.	1990	Washington University	Computer Science
B.S.	1987	Washington University	Computer Science
B.S.	1987	Washington University	Electrical Engineering

EMPLOYMENT HISTORY

Title	Organization	Years
School Chair	Computer Science Georgia Institute of Technology	February 2007-present
Division Chair	Computing Science and Systems Georgia Institute of Technology	August 2005-January 2007
Professor	College of Computing Georgia Institute of Technology	2004-present
Associate Dean	College of Computing Georgia Institute of Technology	2003-2007
Interim Dean	College of Computing Georgia Institute of Technology	May 2002-October 2002
Assistant Dean	College of Computing Georgia Institute of Technology	2000-2003
Associate Professor	College of Computing Georgia Institute of Technology	1999-2004
Assistant Professor	College of Computing Georgia Institute of Technology	1993-1998
Research Assistant	Department of Computer Science Washington University	1987-1993

CURRENT FIELDS OF INTEREST

Computer networking and Computing for social good. Specific areas of current interest include network design, algorithms and services for Internetworking, peer-to-peer and overlay networks, mobile wireless networks and computing for social good.

I. TEACHING

A. Courses Taught

College of Computing, Georgia Institute of Technology

Term/Year	Course	Number of Students	Comments
Fall 1993	CS/CmpE 4760Advanced Computer Architecture	33	
Winter 1994	CS 8113 High Speed Switching Systems	16	New
Spring 1994	CS 4380 Data Communication	25	
Fall 1994	CS/CmpE 4760Advanced Computer Architecture	35	
Fall 1994	CS 8115 Introduction to Graduate Studies	24	
Winter 1995	CS 8113 High Speed Switching Systems	17	
Spring 1995	CS 4380 Data Communication	35	
Fall 1995	CS 6380 Computer Networks	37	
Fall 1995	CS 1155 Understanding and Constructing Proofs	51	
Winter 1996	CS 8113 High Speed Switching Systems	20	
Sum 1996	CS 1155 Understanding and Constructing Proofs	38	
Fall 1996	CS 1155 Understanding and Constructing Proofs	60	
Winter 1997	CS 4380 Data Communication	28	
Winter 1997	CS 6386 High Speed Switching Systems	28	
Fall 1997	CS 1155 Understanding and Constructing Proofs	62	
Fall 1997	CS 6380 Computer Network	38	
Winter 1998	CS 6386 High Speed Switching Systems	31	
Sum 1998	CS 1155 Understanding and Constructing Proofs	61	
Winter 1999	CS 6380 Computer Networks	30	
Spring 1999	CS 4385 Computer Network Protocols	43	
Fall 1999	CS 3251 Computer Networking I	105	New
Spring 2000	CS 7270 Networked Applications and Services	40	New
Fall 2000	CS 3251 Computer Networking I	100	
Spring 2002	CS 7270 Networked Applications and Services	26	
Fall 2003	CS 6250 Computer Networks	60	
Fall 2004	CS 8803 Prep for an Academic Teaching Career	25	New
Spring 2005	CS 3251 Computer Networking I	50	
Fall 2005	CS 3251 Computer Networking I	48	
Fall 2006	CS 1100 Freshman Leap	20	Seminar
Spring 2007	CS 4001 Computers and Society	~40	

Summer2007	CS 4001 Computers and Society	~35	Barcelona w/Foley
Summer2007	CS 4235 Intro to Information Security	~25	Barcelona
Spring 2008	CS 8803 Compute for Good	~20	New w/Vempala
Spring 2009	CS 1050 Constructing Proofs	60	
Fall 2009	CS 4911 Senior Design/8803 Compute for Good	35	w/Vempala
Spring 2010	CS 4001 Computers and Society	40	
Fall 2010	CS 4911 Senior Design/8803 Compute for Good	35	

B. Continuing Education

Emerging Technologies: Asynchronous Transfer Mode, October 1994. Dr. Zegura was the sole developer and teacher of a section on Asynchronous Transfer Mode as part of the Emerging Transfer Technologies Continuing Education Course.

C. Curriculum Development

CS 6386/8113: High Speed Switching Systems. New graduate course concentrating on the design and analysis of switching systems capable of operating at high speeds (mega bits per second per interface) and supporting diverse application needs (e.g., real-time, bursty, rate-adaptive, multipoint). This course has become part of the regular Networking and Telecommunications curriculum.

CS3251: Computer Networks I. New undergraduate course providing an introduction to problems in computer networking, including errors, medium access, routing, flow control and transport. Emphasis is on current best practice, and specifically on solutions deployed in the current Internet. Includes programming of networked applications.

CS 7270: Networked Applications and Protocols. New graduate course providing depth in the upper layer(s) of the protocol stack. The course covers a selection of network applications and services that may vary from one offering to the next. In Spring 2002, the set of topics included peer-to-peer networks, server selection, network monitoring, mobile/ad-hoc services and active services. The course material will come primarily from research papers. The course will include a significant project component that will typically require sockets programming.

CS 4803/8803: Compute for Social Good. New undergraduate and graduate course emphasizing real-world projects that apply computing to solve social problems. Co-developed with Santosh Vempala.

D. Individual Student Guidance

1. Postdoctoral Fellows Supervised

M. Bill McKinnon III: Winter 1998-Winter 1999 (25% time)
Co-supervised by Ken Calvert
Performance analysis of active networking

Sapan Bhatia: Fall 2006
Automated methods for making legacy protocols delay tolerant
Position: Research scientist, Princeton University

2. Ph.D. Students Supervised

Michael Jeff Donahoo

Graduation date: Summer 1998
Thesis title: Application-based enhancement to network-layer multicast
Initial Position: Assistant Professor, Baylor University

Samrat Bhattacharjee
Graduation date: Summer 1999 (co-supervised by Ken Calvert)
Thesis title: Active networking: architectures, composition, and applications
Initial Position: Assistant Professor, University of Maryland

Fang Hao
Graduation date: Summer 2000
Thesis title: Scalability techniques in QoS networks
Initial Position: Lucent Technologies, Bell Labs Research

Zhiruo Cao
Graduation date: Summer 2000
Thesis title: Network support for adaptive applications
Initial Position: Cisco Systems

Tianji Jiang
Graduation date: Summer 2000 (co-supervised by Mostafa Ammar)
Thesis title: Accommodating heterogeneity and scalability for multicast communication
Initial Position: Cisco Systems

Youngsu Chae
Graduation date: Fall 2002
Thesis title: Algorithms, protocols and services for scalable multimedia streaming
Initial Position: Samsung, Korea

Richard Liston
Graduation date: August 2004
Thesis title: Measuring user-perceived Internet performance in multiple locations
Initial Position: Assistant Professor, Ursinus College, Pennsylvania

Shashidhar Merugu
Graduation date: Fall 2005
Thesis title: Network design and routing in peer-to-peer and mobile ad-hoc networks
Initial Position: Riverbed Networks, San Francisco, California

Pradnya Karbhari
Graduation date: Fall 2005 (co-supervised by Mostafa Ammar)
Thesis title: Throughput and fairness considerations in overlay networks for content distribution
Initial Position: Google Research, Mountain View, California

Meng Guo

Graduation date: Fall 2005 (co-supervised by Mostafa Ammar)
Thesis title: Supporting scalable and resilient video streaming applications in evolving networks
Initial Position: Google Research, Mountain View, California

Abhishek Kumar
Graduation date: Fall 2005 (co-supervised by Jim Xu)
Thesis title: Network data streaming: Algorithms for network measurement and monitoring
Initial Position: Eagle Eye Networks (startup)

Wenrui Zhao
Graduation date: Summer 2006 (co-supervised by Mostafa Ammar)
Thesis title: Routing and network design in delay tolerant networks
Initial Position: Ask.com

Ruomei Gao
Graduation date: August 2007 (co-supervised by Constantinos Dovrolis)
Thesis title: Interdomain traffic engineering for multihomed networks
Initial Position: Akamai

Hyewon Jun
Graduation date: Fall 2007 (co-supervised by Mostafa Ammar)
Thesis title: Power management in disruption tolerant networks
Initial position: Google, New York

Sridhar Srinivasan
Graduation date: Spring 2007
Thesis title: Design and use of managed overlay networks
Initial position: Google

Cong Shi
In progress (co-supervised by Mostafa Ammar)
Thesis topic: Security and applications in disruption tolerant networks

Samantha Lo
In progress (co-supervised by Mostafa Ammar)
Thesis topic: Network virtualization

3. Ph.D. Special Problems Students [incomplete]

Yang Chen
Topic: Characterization and control of mobile wireless networks

Ahmed Mansy
Topic: Mobile wireless networks

Lei Li: Spring 2002-Spring 2003
 Session layers in wireless networks

Matthew Sanders: Spring 2000-2002
 Active anycasting

Lenitra Clay: Spring1997, 2000-2002
 Replication techniques for content distribution

Siddharth Bajaj: Winter 1997-Spring1997
 Network services in asymmetric environments

Yaakov Eisenberg: Winter1995
 Large-scale addressing

Phyllis Schneck: Winter 1994-Spring 1996
 Networking and scientific computation for atmospheric applications
 Workload generation and graph models for networks
 Dynamic resource reservation

4. M.S. Special Problems Students [incomplete]

Sethu Raman: Fall 2010 - present
 Adaptive networking for the developing world

Daphne Larose: Spring 2011 - present
 Technology support for Mental Health in Liberia

Stefano Parmesan: Spring 2011 - present
 Data collection, analysis and visualization for agro-dealers in Zambia

Ankita Jain: Fall 2005
 Mobility models for disruption tolerant networking

Trevor Robbie: Spring, Fall 2001
 Implementation of scalable fair queuing

Matthew Sanders, Spring 1998 – Fall 1998
 Active anycasting

Ramkumar Krishnan: Winter 1998 – Fall 1998
 Simulation of active networking

Albert Leach: Winter 1997
 ATM laboratory assistant

David Pope: Winter 1998
Networking to the home

Jae Young Jang: Summer 1998
ATM switching and multi-chip modules

Chang-tien Lu: Summer 1995
Wide-area multicast routing

Wei Guan: Summer 1995
Wide-area multicast routing

Weimin Feng: Fall 1994
Network modeling

Richard Dennis: Summer 1994
Experimentation with ATM switches

Yoshikatsu Fujita: Winter 1994
Comparison of queuing in switching networks

Ramesh Madhavan: Winter 1994
Issues in core-based tree implementation

5. Undergraduate Special Problem Students [incomplete]

Evan Zanoski: Fall 2007 – Spring 2008
DTN application development

Kevin Webb: Fall 2006 – Spring 2008
Prototyping a disruption-tolerant network with message ferrying

Jon Olson: Summer 2005 – Summer 2008
Prototyping a disruption-tolerant network with message ferrying

Alex Levin: Spring 2002
Design and Implementation of a Virtual ATM Link over IP

Arief Sugianto: Fall 2000 – Spring 2001
Design and Implementation of a Virtual ATM Link over IP

Victor Pate: Spring 2000
Applications of a high speed switch kit

Scott McMahon and Yasir Arain: Spring 2000

Design and Implementation of a Virtual ATM Link over IP

Holly Fait: Summer 2000
Implementation of scalable fair queuing
Participant in CRA Distributed Mentor Program

Ching-Ying Wang: Summer 2000
Implementation of a dynamic community infrastructure
Participant in CRA Distributed Mentor Program

Catherine Eichholz: Summer 1998
Anycasting
Participant in CRA Distributed Mentor Program
Position: Computer Science Ph.D. Program at Georgia Tech

David Haynes: Fall 1996 – Spring 1998
Demonstration of active networking

Maria Gullickson: Summer 1997 – Winter 1998
Adaptive applications and anycasting
Participation in CRA Distributed Mentor Program
Position: Computer Science Ph.D. Program at U. of Washington

Alisa Marzilli: Summer 1997
Adaptive applications
Participant in CRA Distributed Mentor Program

Ojas Parekh: Fall 1996
Dynamic resource management
Position: Mathematical Sciences Ph.D. Program at Carnegie Mellon

M. Scott McFarland: Winter 1997
Dynamic resource management

Elizabeth Edwards: Summer 1995
A network topology tool
Participant in CRA Distributed Mentor Program
Position: Computer Science Ph.D. Program at Georgia Tech

Megan Thomas: Summer 1994
Random graphs to model internetworks
Participant in CRA Distributed Mentor Program
Position: Computer Science Ph.D. Program at U.C. Berkeley

II. RESEARCH AND CREATIVE SCHOLARSHIP

A. Thesis

D.Sc. Thesis

Title: Analysis of Switching Networks for Multipoint and Multirate Communication
Completed: August 1993
Advisor: Professor Jonathan S. Turner
University: Washington University

M.S. Thesis

Title: Parallel Simulated Annealing Using Speculative Computation
Completed: May 1990
Advisor: Professor Mark A. Franklin
University: Washington University

B. Published Journal Papers (refereed)

1. Witte (Zegura), E., Chamberlain, R., Franklin, M. "Parallel Simulated Annealing Using Speculative Computation." IEEE Transactions on Parallel and Distributed Systems, 2(4), October 1991.
2. Zegura, E.W. "A Quantitative Comparison of Architectures for ATM Switching Systems." IEEE Communications Magazine, 31(2), February 1993.
3. Zegura, E.W. "Evaluating Blocking Probability in Generalized Connectors." ACM/IEEE Transactions on Networking, August 1995.
4. Calvert, K.L., Doar, M., Zegura, E.W. "Modeling Internet Topology." IEEE Communications Magazine, June/July1997.
5. Donahoo, M.J., Zegura, E.W., Calvert, K.L. "Center Selection and Migration for Wide-area Multicast Routing." Journal of High Speed Networks, 6(2,) 1997.
6. Zegura, E.W., Calvert, K.L., Donahoo, M.J. "A Quantitative Comparison of Graph-based Models for Internet Topology." ACM/IEEE Transactions on Networking, 5(6), December 1997.
7. Zegura, E.W., McFarland, S., Parekh, O. "A Survey and New Results in Renegotiated Service." Journal of High Speed Networks, 6(3), 1997.
8. Park, W.-B., Owen, H., Zegura, E.W. "SONET/SDH Traffic Generation Models." European Transactions on Telecommunications, M. Decina, editor-in-chief, January/February 1998.
9. Bhattacharjee, S., Calvert, K.L., Zegura, E.W. "Active Networking and End-to-end Arguments. "IEEE Network, May 1998. (Note that this is a two-page peer-reviewed commentary.)
10. Calvert, K.L., Bhattacharjee, S., Zegura, E.W., Sterbenz, J. "Directions in Active Networks." IEEE Communications Magazine Special Issue on Programmable Networks,

October 1998.

11. Park, W.-B., Owen, H., Zegura, E.W. "Intact versus Fractional Switching in SONET/SDH Crossconnects." European Transactions on Telecommunications, M. Decina, editor-in-chief, 1999.
12. Zegura, E.W., Ammar, M., Bhattacharjee, S., Fei, Z. "Application Layer Anycasting: A Server Selection Architecture and Use in a Replicated Web Service." IEEE/ACM Transactions on Networking, August 2000.
13. Hao, F., Zegura, E.W., Ammar, M. "QoS Routing for Anycast Communications: Motivation and an Architecture for DiffServ Networks." IEEE Communications Magazine, June 2002.
14. Fei, Z., Ammar, M., Zegura, E. W. "Multicast Server Selection: Problems, Complexity and Solutions." IEEE Journal on Selected Areas in Communications, September 2002.
15. Chae, Y., Guo, K., Buddhikot, M., Suri , S., Zegura , E.W. "Silo, Rainbow and Caching Token: Schemes for Scalable, Fault Tolerant Stream Caching." IEEE Journal on Selected Areas in Communications, Fall 2002.
16. Fei, Z., Yang, M. Ammar, M., Zegura, E.W. "A Framework for Allocating Clients to Rate-Constrained Multicast Servers." Computer Communications, July 2003.
17. Merugu, S., Srinivasan, S., Zegura, E.W. "Adding Structure to Unstructured Peer-to-Peer Networks: the Use of Small-World Graphs." Special Issue of Journal of Parallel and Distributed Computing on Theoretical and Algorithmic Aspects of f Sensor, Ad Hoc Wireless and Peer-to-Peer Networks, Vol. 65, No. 2, pp. 142-153, February 2005.
18. Jun, H., Zhao, W., Ammar, M., Zegura, E.W., Lee, C. "Trading Latency for Energy in Densely Deployed Wireless Ad Hoc Networks using Message Ferrying." Elsevier Ad Hoc Networks Journal, May 2007.
19. Jun, H., Ammar, M., Corner, M., Zegura, E.W. "Hierarchical Power Management in Disruption Tolerant Networks Using Traffic Aware Optimization." Elsevier Computer Communications, October 2009.
20. Chen, Y., Borrel, V., Ammar, M., Zegura, E.W. "A Framework for Characterizing the Wireless and Mobile Network Continuum." Computer Communications Review, January 2011.
21. Polat, B., Sachdeva, P., Ammar, M. Zegura, E.W, "Message Ferries as Generalized Dominating Sets in Intermittently Connected Mobile Networks", to appear in Pervasive and Mobile Computing Journal.

C. <u>Conference Presentations</u>

C.1. Conference Presentations with Proceedings (refereed)

1. Chamberlain, R., Edelman, M., Franklin, M., Witte (Zegura), E. “Simulated Annealing on a Multiprocessor.” Proceedings of IEEE International Conference on Computer Design (ICCD), 1988.

2. Witte (Zegura), E., Chamberlain, R., Franklin, M. “Parallel Simulated Annealing Using Speculative Computation.” Proceedings of International Conference on Parallel Processing (ICPP), 1990.

3. Witte (Zegura), E., Chamberlain, R., Franklin, M. “Task Assignment by Parallel Simulated Annealing." Proceedings of IEEE International Conference on Computer Design (ICCD), 1990.

4. Zegura, E.W. “Evaluating Blocking Probability in Distributors.” Proceedings of IEEE INFOCOM, 1993.

5. Zegura, E.W. “Routing Algorithms in Multicast Switching Topologies.” Proceedings of Allerton Conference on Communication, Control and Computing, 1993.

6. Zegura, E.W. “An Improved Model for Evaluating Blocking Probability in Generalized Connectors.” Proceedings of IEEE INFOCOM, 1994.

7. Park, W.-B., Owen, H.L., Zegura, E.W. “Sonet/SDH Multicast Routing Algorithms in Symmetrical Three-Stage Networks.” Proceedings of International Conference on Communications (ICC), 1995.

8. Calvert, K.L., Zegura, E.W., Donahoo, M.J. “Core Selection Methods for Multicast Routing.” Proceedings of International Conference on Computer Communications and Networks (ICCCN), 1995.

9. Zegura, E.W. “Impact of Multichip Module Technology on ATM Switch Architectures.” Proceedings of Third ORSA Telecommunications Conference, Boca Raton, FL. 1995.

10. Zegura, E.W., Calvert, K.L., Bhattacharjee, S. “How to Model an Internetwork.” Proceedings of IEEE INFOCOM, 1996.

11. Park,W.-B., Owen, H.L., Zegura, E.W. “Connection Request Model for Sonet/SDH Switch Evaluation.” Proceedings of International Conference on Communications (ICC), 1996.

12. Donahoo, M.J., Zegura, E.W. “Core Migration for Dynamic Multicast Routing.” Proceedings of International Conference on Computer Communications and Networks (ICCCN), 1996.

13. Schneck, P., Zegura, E.W., Schwan, K. “DRRM: Dynamic Resource Reservation

Manager." Proceedings of International Conference on Computer Communications and Networks (ICCCN), 1996.

14. Hao, F., Wilson, K., Fujimoto, R., Zegura, E. "Logical Process Size in Parallel Simulations." Proceedings of Winter Simulation Conference '96. Hao is the primary author, with contributions from Wilson and supervision by Fujimoto and Zegura.

15. Bhattacharjee, S., Calvert, K.L., Zegura, E.W. "An Architecture for Active Networking." Proceedings of IFIP Conference on High Performance Networking, 1997.

16. Bhattacharjee, S., Ammar, M., Zegura, E.W., Shah,V., Fei,Z. "Application-Layer Anycasting." Proceedings of IEEE INFOCOM, 1997.

17. Cao, Z., Zegura, E.W. "ABR Service for Applications with Non-linear Bandwidth Utility Functions." Proceedings of International Conference on Network Protocols (ICNP), 1997.

18. Bhattacharjee, S., Calvert, K.L., Zegura, E.W. "Active Networking Applications and the End-to-End Argument." Proceedings of IEEE International Conference on Network Protocols (ICNP), 1997.

19. Fei, Z., Bhattacharjee, S., Zegura, E.W., Ammar, M. "A Novel Server Selection Technique for Improving the Response Time of a Replicated Service." Proceedings of IEEE INFOCOM, 1998.

20. Bhattacharjee, S., Calvert, K.L., Zegura, E.W. "Self-Organizing Wide-Area Network Caches." Proceedings of IEEE INFOCOM, 1998.

21. Hao, F., Nikolaidis, I., Zegura, E.W. "Efficient Simulation of ATM Networks with Accurate End-to-End Delay Statistics." Proceedings of IEEE International Conference on Communications (ICC), 1998.

22. Jiang, T., Ammar, M., Zegura, E.W. "Inter-Receiver Fairness: A Novel Performance Measure for Multicast ABR Sessions." Proceedings of ACM SIGMETRICS, 1998.

23. Jiang, T., Zegura, E.W., Ammar, M. "Improved Consolidation Algorithms for Point-to-Multipoint ABR Service." Proceedings of IEEE ATM Workshop, 1998.

24. Hao, F., Zegura, E.W., Bhatt, S. "Performance of the PNNI Protocol in Large Networks." Proceedings of IEEE ATM Workshop, 1998.

25. Bhattacharjee, S., Calvert, K.L., Zegura, E.W. "Reasoning about Active Networking Protocols." Proceedings of IEEE International Conference on Network Protocols (ICNP), 1998.

26. Chae, Y.-S., Zegura, E.W. "Service-Specific ABR Routing Algorithms." Proceedings of International Conference on Computer Communications and Networks (ICCCN), 1998.

27. Chamlee, M., Zegura, E.W. “Clustering Algorithms for Hierarchical Address Assignment.” Proceedings of International Conference on Computer Communications and Networks (ICCCN), 1998.

28. Cao, Z., Zegura, E.W. “Utility Max-Min: An Application-Oriented Bandwidth Allocation Scheme.” Proceedings of IEEE INFOCOM, March 1999.

29. Donahoo, M., Ammar, M., Zegura, E.W. “Multiple-Channel Multicast Scheduling for Scalable Bulk-data Transport.” Proceedings of IEEE INFOCOM, March 1999.

30. Jiang, T., Ammar, M., Zegura, E. W. “Inter-receiver fair multicast communication over the Internet. "Proceedings of NOSSDAV, June 1999.

31. Merugu, S., Bhattacharjee, S., Chae, Y., Sanders, M., Calvert, K., Zegura, E.W. “Bowman and CANEs: Implementation of an Active Network.” Invited paper in Thirty-Seventh Annual Allerton Conference on Communication, Control and Computing, Monticello, Illinois, September 1999.

32. Fei, Z., Ammar, M., Zegura, E.W. “Optimal Allocation of Clients to Replicated Multicast Servers.” Proceedings of IEEE International Conference on Network Protocols (ICNP), October 1999.

33. Cao, Z., Zegura, E.W., Wang, Z. “Rainbow Fair Queueing: Fair Bandwidth Sharing Without Per-Flow State.” Proceedings of IEEE INFOCOM, March 2000.

34. Cao, Z., Zegura, E.W., Wang, Z. “Performance of Hashing-Based Schemes for Internet Load Balancing.” Proceedings of IEEE INFOCOM, March 2000.

35. Hao, F., Zegura, E.W. “On Scalable Qos Routing: Performance Evaluation of Topology Aggregation.” Proceedings of IEEE INFOCOM, March 2000.

36. Merugu, S., Bhattacharjee, S., Calvert, K., Zegura, E.W. “Bowman: A NodeOS for Active Networking.” Proceedings of IEEE INFOCOM, March 2000.

37. Jiang, T., Ammar, M., Zegura, E.W. “On the Use of Destination Set Grouping to Improve Inter-Receiver Fairness for Multicast ABR Sessions.” Proceedings of IEEE INFOCOM, March 2000.

38. Chae, Y., Merugu, S., Zegura, E. W., Bhattacharjee, S. “Exposing the Network: Support for Topology Sensitive Applications.” Proceddings of IEEE Open Arch, March 2000.

39. Hao, F., Zegura, E.W., Ammar, M. “Supporting Server Selection in Differentiated Service Networks.” Proceedings of IEEE INFOCOM, April 2001.

40. Sanders, M., Keaton, M., Bhattacharjee, S., Calvert, K., Zabele, S., Zegura, E.W. “Active

Reliable Multicast on CANEs: A Case Study." Proceedings of IEEE Open Arch, April 2001.

41. Liston, R. and Zegura, E.W. "Using a Proxy to Measure Client-Side Web Performance." Proceedings of Web Caching and Content Distribution Workshop, June 2001.

42. Fei, Z., Ammar, M., Zegura, E.W. "Efficient server replication and client re-direction for multicast services." SPIE Int'l Conference on Scalability and Traffic Control in IP Networks, August 2001.

43. Hutchins, R., Zegura, E.W., Liashenko, A., Enslow, P. Jr. "Internet User Access via Dial-up Networks-Traffic Characterization and Statistics." Proceedings of IEEE International Conference on Network Protocols (ICNP), November 2001.

44. Fei, Z., Yang, M., Ammar, M., Zegura, E.W. "Allocating Clients to Constrained Multicast Servers: An Optimal Solution." Proceedings of International Conference on Computer Communications and Networks (ICCCN), October 2001.

45. Srinivasan, S., Zegura, E.W. "Network Measurement as a Cooperative Enterprise." Proceedings of International Workshop on Peer-to-Peer Systems (IPTPS), March 2002.

46. Hutchins, R., Zegura, E.W. "Measurements from a Campus Wireless Network." Proceedings of IEEE International Conference on Computer Communications (ICC), April 2002.

47. Guo, M., Ammar, M., Zegura, E.W., Hao, F. "A Probe-Based Server Selection Protocol for Differentiated Service Networks." Proceedings of IEEE International Conference on Computer Communications (ICC), April 2002.

48. Guo, M., Ammar, M., Zegura, E.W., "Selecting Among Replicated Batching Video-on-Demand Servers." Proceedings of NOSSDAV, May 2002.

49. Chae, Y., Zegura, E.W., Delalic, H. "PAMcast: Programmable Any-Multicast for Scalable Message Delivery." Proceedings of Open Arch, June 2002.

50. Clay, L., Ammar, M., Zegura, E.W. "Protocols for Selection Among Replicated Multicast Servers". Proceedings of the International Conference on Internet Computing, June 2002.

51. Zou, L., Zegura, E.W., Ammar, M. "The Effect of Peer Selection and Buffering Strategies on the Performance of Peer-to-Peer File Sharing." IEEE/ACM MASCOTS, October 2002.

52. Liston, R., Zegura, E.W. "Diversity in DNS Performance Measures." Internet Measurement Workshop (IMW), November 2002.

53. Karbhari P., Zegura, E.W., Ammar, M. "Multipoint-to-point Session Fairness in the Internet." Proceedings of INFOCOM, March 2003.

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54. Clay, L., Ammar, M., Zegura, E.W., Clark, R. “Posting Protocol for Improved Keyword Searches in Peer-to-Peer Systems.” Proceedings of Multimedia Computing and Networking (MMCN), January 2003.

55. Jun, H., Sanders, M., Ammar, M., Zegura, E.W. “Binding Clients to Replicated Servers: Initial and Continuous Binding.” Proceedings of the IEEE Workshop on Future Trends in Distributed Computing Systems (FTDCS), June 2003.

56. Karbhari, P., Ammar, M., Dhamdhere, A., Raj, H., Riley, G., Zegura, E.W. “Bootstrapping in Gnutella: A Measurement Study,” Proceedings of the Passive and Active Networking Workshop (PAM), April 2004.

57. Zhao, W., Ammar, M., Zegura, E.W. “A Message Ferrying Approach for Data Delivery in Sparse Mobile Ad Hoc Networks.” Proceedings of ACM MOBIHOC, May 2004.

58. Guo, M., Ammar, M., Zegura, E.W. “Cooperative Patching: A Client-based P2P Architecture for Supporting Continuous Live Video Streaming,” Proceedings of the IEEE International Conference on Computers, Communications and Networks (IC3N), October 2004.

59. Zhao, W., Ammar, M., Zegura, E.W. “The Energy-Limited Capacity of Wireless Networks.” Proceedings of IEEE Conference on Sensor and Ad hoc Communications and Networks, October 2004.

60. Zhao, W., Ammar, M., Zegura, E.W. “Controlling the Mobility of Multiple Data Transport Ferries in a Delay Tolerant Network.” Proceedings of IEEE INFOCOM, 2005.

61. Guo, M., Ammar, M., Zegura, E.W. “V3: A Vehicle-to-Vehicle Live Video Streaming Architecture.” Proceedings of IEEE Conference on Pervasive Computing and Communications (PerCom), March 2005.

62. Jun, H., Zhao, W., Ammar, M., Zegura, E.W. “Trading Latency for Energy in Wireless Ad hoc Networks using Message Ferrying.” Proceedings of IEEE PerCom Workshop on Pervasive Wireless Networking, March 2005.

63. Karbhari, P., Ammar, M., Zegura, E.W. “Optimizing End-to-End Throughput for Data Transfers on an Overlay-TCP Path.” Proceedings of IFIP NETWORKING, May 2005.

64. Srinivasan, S. Zegura, E.W. “Scheduling Uplink Bandwidth in Application-Layer Multicast Trees.” Proceedings of IFIP NETWORKING, May 2005.

65. Gao, R., Dovrolis, C., Zegura, E.W. “Interdomain Ingress Traffic Engineering through Optimized AS-Path Prepending.” Proceedings of IFIP NETWORKING, May 2005.

66. Zhao, W., Ammar, M., Zegura, E.W. “Multicast Routing in Delay Tolerant Networks:

Semantic Models and Routing Algorithms.” SIGCOMM DTN Workshop, August 2005.

67. Jun, H., Ammar, M., Zegura, E.W. “Power Management in Delay Tolerant Networks: A Framework and Knowledge-Based Mechanisms” IEEE Conference on Sensor and Ad hoc Communications and Networks, September 2005.

68. Gao, R., Dovrolis, C., Zegura, E.W. “Avoiding Oscillations due to Intelligent Route Control Systems.” IEEE Infocom, April 2006.

69. Tariq, M., Ammar, M., Zegura, E.W., “Message Ferry Route Design for Sparse Ad hoc Networks Ad hoc Networks with Mobile Nodes," ACM Mobihoc, May 2006.

70. Chen, Y., Yang, J., Zhao, W., Ammar, M., Zegura, E.W., “Multicasting in Sparse MANETs using Message Ferrying," IEEE Wireless Communications and Networking Conference (WCNC), April 2006.

71. Jun, Y., Ammar, M., Corner, M., Zegura, E.W. “Hierarchical Power Management in Disruption Tolerant Networks with Traffic-Aware Optimization.” ACM CHANTS, September 2006.

72. Zhao, W., Chen, Y., Ammar, M., Corner, M., Levine, B., Zegura, E.W. “Capacity Enhancement using Throwboxes in DTNs.” IEEE MASS, October 2006.

73. Chen, Y., Zhao, W., Ammar, M., Zegura, E.W. "Hybrid Routing in Clustered DTNs with Message Ferrying," Proceedings of ACM MobiOpp Workshop, Puerto Rico, May 2007.

74. Borrel, V., Ammar, M., Zegura, E.W.,"Understanding the Wireless and Mobile Network Space: A Routing-Centered Classification," Proceedings of CHANTS 2007, Montreal, September 2007.

75. Mansy, A., Ammar, M., Zegura, E.W. "Reliable Roadside-to-Roadside Data Transfer Using Vehicular Traffic," Proceedings of The IEEE International Workshop on Mobile Vehicular Networks (MoVeNet) (IEEE MASS Workshop), Pisa, Italy, October 2007.

76. Gao, R., Blair, D., Dovrolis, C., Morrow, M., Zegura, E.W. “Interactions of Intelligent Route Control with TCP Congestion Control,” In the Proceedings of the Networking conference, Atlanta, May 2007.

77. Polat, B., Sachdeva, P., Ammar, M., Zegura, E.W. "Message Ferries as Generalized Dominating Sets in Intermittently-Connected Networks", 2nd ACM International Workshop on Mobile Opportunistic Networking, February 2010, Pisa, Italy.

C.2. <u>Conference Presentations with Proceedings (non-refereed)</u>

1. Bhattacharjee, S., Calvert, K., Zegura, E.W. 1996 "Implementation of an Active Networking Architecture." Washington University Gigabit Networking Workshop. St. Louis, MO, July 1996.

2. Bhattacharjee, S., Calvert, K., Zegura, E.W. 1996. "Active networking: An End to the IP/ATM Debate?" Workshop on the Integration of IP and ATM. St. Louis, MO, November 1996.

3. Zegura, E.W. 1996. "Mapping Complex Applications to Network Services." 7th Workshop on Very High Speed Networks. Baltimore, MD, November 1996.

4. Bhattacharjee, S., Calvert, K., Zegura, E.W. 1998. "Congestion Control and Caching in CANEs." IEEE International Conference on Communications (ICC '98), Workshop on Active Networking and Programmable Networks.

5. Zhiruo, C., Zegura, E.W. 2000. "Rainbow fair queueing: fair bandwidth sharing without per-flow state." 2nd Washington University/NSF Gigabit Kits Workshop. January 2000.

6. Zegura, E.W. 2000. "Progress on rainbow fair queueing and virtual link implementations." 3rd Washington University/NSF Gigabit Kits Workshop. July 2000.

C.3. Conference Presentations without Proceedings

1. "A Quantitative Comparison of Architecture for ATM Switching Systems." 3rd Workshop on Very High Speed Networks, Greenbelt, MD, March 1992.

2. Panel participant, IEEE Infocom '98 panel on Active Networking. San Francisco, CA, March 1998.

3. "Performance Monitoring for Dynamic Server Selection." 1st Workshop on Internet Server Performance, Madison, WI, June 1998.

4. Panel participant, Global Internet 2001 panel on Network Topology, San Antonio, TX November 2001.

D. Other

D.1. Submitted Journal Papers

None.

D.2. Published Papers (non-refereed)

a. Technical Reports

1. Chamberlain, R., Edelman, M., Franklin, M., Witte (Zegura), E. 1988. "Parallel Simulated

Annealing." Technical Report WUCS-88-12, Department of Computer Science, Washington University.

2. Witte (Zegura), E. 1991. "A Quantitative Comparison of Architectures for ATM Switching Systems." Technical Report WUCS-91-47. Department of Computer Science, Washington University.

3. Witte (Zegura), E. 1992. "The Clos Network as a Multirate Distributor with a Greedy Routing Algorithm." Technical Report WUCS-92-13. Department of Computer Science, Washington University.

4. Calvert, K.L. Madhavan, M., Zegura, E.W. 1994. "A Comparison of Two Practical Multicast Routing Schemes." Technical Report GIT-CC-94-25. College of Computing, Georgia Tech.

5. Thomas, M., Zegura, E.W. 1994. "Generation and Analysis of Random Graphs to Model Routing." Technical Report GIT-CC-94-46, College of Computing, Georgia Tech.

6. Calvert, K.L., Zegura, E.W., Donahoo, M.J. 1995. "Core Selection Methods for Multicast Routing." Technical Report GIT-CC-95-15, College of Computing, Georgia Tech.

7. Donahoo, M.J., Zegura, E.W. 1995. "Core Migration for Dynamic Multicast Routing" Technical Report GIT-CC-95-28, College of Computing, Georgia Tech.

D.3. Software

1. **GT-ITM: Georgia Tech Internetwork Topology Models**
   This is a collection of routings to generate and analyze graphs using a wide variety of models for internetwork topology.

2. **CANEs/Bowman**
   A platform for active networking, including the CANEs execution environment and the Bowman Node Operating System.
   B. Bhattacharjee, S. Merugu, M. Sanders, K. Calvert, E. Zegura
   Released Fall 2002.

3. **WISL: What the Internet Sounds Like**
   Distributed network monitoring and sound generation.
   R. Liston, E. Zegura
   Released in 2003.

4. **p-sim**
   Simulator for peer-to-peer networks.
   S. Merugu, S. Srinivasan, E. Zegura
   Released Spring 2003.

5. **Disruption Tolerant Networking on Handhelds**
   DTN bundle specification implementation in .net for handheld devices
   J. Olson, K. Webb, M. Ammar, E. Zegura
   Released Fall 2006.

E. Research Proposals and Grants (Principal Investigator)

a. Approved and Funded

1. **Distributed Mentor Project**
   Computing Research Association (CRA)
   Funded $5,000 per year (1994, 1995, 1996, 1997, 1998, 2000)

2. **A Testbed for Multimedia Communication Protocols**
   AT&T Special Purpose Grants
   Joint proposal with M. Ammar, K. Calvert, P. Enslow, Jr., A. Mukherjee (co-PIs)
   Funded $20,000, September 1994

3. **Low-Cost ATM Switch Architectures**
   Georgia Tech Engineering Research Center in Packaging
   Funded $17,500, Fall 1994 – Summer 1995

4. **CAREER: A Systematic Approach to the Design of Cost-Effective, High Performance Switching Architectures**
   CAREER Program, National Science Foundation (NSF)
   Funded $131,479, 5/1/95 – 5/1/98

5. **Networking Instructional Laboratory Enhancements**
   AT&T Special Purpose Grants
   Joint Proposal with M. Ammar, K. Calvert, P. Enslow, Jr., J. Limb, A. Mukherjee (co-PIs)
   Result: Funded $30,000, October 1995

6. **Application-Based Traffic Management for ATM Networks**
   Hitachi Telecom, USA
   Joint proposal with J. Aaron, M. Ammar, J. Evans, D. Howard, J. Limb (co-PIs)
   Funded $260,000, 11/1/95 – 11/1/96

7. **S3: Scalable, Self-Organizing Simulations**
   Defense Advanced Research Projects Agency (DARPA)
   Joint proposal with M. Chen, J. Cowie, R. Fujimoto, D. Leskiw, D. Nichol, A. Ogielski, S. Bhatt (co-PIs)
   Funded $3,200,000, 8/1/96 – 8/1/99
   GT Subcontract Amount: $440,000

8. **Remote Teaching and Collaboration Facility**

AT&T Special Purpose Grants
Joint Proposal with M. Ammar, K. Calvert, P. Enslow, Jr., J. Limb (co-PIs)
Funded $20,000, October 1996

9. **Application-Driven ABR Support**
   Hitachi Telecom, USA
   Funded $54,100, 11/1/96 – 11/1/97

10. **Research Experience for Undergraduates – Supplement to CAREER Award**
    National Science Foundation (NSF)
    Funded $20,125, April 1997

11. **Research and Teaching in High Performance Networking and Distributed Systems**
    Washington University and NSF (Gigabit ATM Network Kits Program)
    Joint Proposal with K. Calvert, K. Schwan and S. Yalamanchili
    Funded, Summer 1997

12. **CANEs: Composable Active Network Elements**
    Defense Advance Research Projects Agency (DARPA)
    Joint proposal with K. Calvert and J. Sterbenz (co-PIs)
    Funded $944,248, 6/15/97 – 6/1/99

13. **Satellite Aware Multicasting**
    NASA Graduate Student Researchers Program
    Funded $44,000, 6/1/97 – 6/1/99

14. **Travel Support for ACM Sigcomm '97**
    National Science Foundation (NSF)
    Funded $14,000, September 1997

15. **LAWS: Load-Adaptive Web Server**
    Georgia Tech Broadband Telecommunications Center
    Funded $45,000, May 1997

16. **ActiveCast**
    Defense Advance Research Projects Agency (DARPA)
    Joint proposal with K. Calvert and J. Griffioen (co-PIs)
    Funded $1.5M, 5/99 – 4/02
    GT Subcontract Amount: $500,000

17. **Server Selection in Emerging Information Delivery Environments**
    National Science Foundation
    Joint Proposal with M. Ammar (co-PI)
    Funded $399,000, 11/99 – 10/02

18. **ITR/SII: Collaborative Research in Internet Topology Models – A Foundation for**

Large-Scale Simulations
National Science Foundation
Joint Proposal with J. Stasko and K. Calvert (co-PIs)
Funded $500,000, 9/00 – 8/03
GT Amount: $385,000

19. **MOWER – Mobile Endpoint Wireless Routing for the LAWN**
Cisco
Joint Proposal with R. Clark and R. Hutchins (co-PIs)
Funded $60,000, January 2002 – January 2003

20. **Peer-to-Peer Content Distribution Services and Architectures**
Georgia Tech Broadband Institute
Joint Proposal with M. Ammar (co-PI)
Result: Funded $30,000, August 2002 – July 2003

21. **Design and Evaluation of Retrieval Functions in Peer-Peer File Sharing Systems**
National Science Foundation (NSF)
Joint Proposal with M. Ammar (co-PI)
Funded $300,000, October 2003 – September 2006

22. **ITR: Message Ferrying: Mobility-Assisted Data Delivery in Highly Partitioned Networks**
National Science Foundation (NSF)
Funded $300,000, October 2003 – September 2006

23. **Mobility-Assisted Data Delivery in Wireless Networks**
Georgia Tech Broadband Institute
Joint Proposal with M. Ammar (co-PI)
Funded $30,000, August 2004 – July 2005

24. **ALeRT: Adaptive Learning and Routing Technologies for Disruption Tolerant Networks**
Defense Advance Research Projects Agency (DARPA)
Joint Proposal with M. Ammar, M. Corner and B. Levine (co-PIs)
Funded $274,400, February 2005 – April 2006

25. **Collaborative Research in Construction of Robust and Efficient Disruption Tolerant Networks**
National Science Foundation (NSF)
Joint Proposal with M. Ammar, Mark Corner (UMass) and Brian Levine (UMass) (co-PIs)
Funded $1,500,000, August 2005 – July 2009
GT Amount: $750,000

26. **Intelligent Route Control**
National Science Foundation (NSF)

Joint Proposal with M. Ammar, C. Dovrolis (co-PIs)
Result: Funded $200,000, September 2005 – August 2007

27. **Architectures and Protocols for Disruption Tolerant Mobile Wireless Networks**
Cisco University Research Program
Joint Proposal with M. Ammar (co-PI)
Result: Funded $80,000, September 2006 – August 2007

28. **DOME: Disruption Tolerant Outdoor Mobile Environments**
Defense Advance Research Projects Agency (DARPA)
Joint Proposal with M. Ammar, M. Corner and B. Levine (co-PIs)
Funded $600,000, September 2006 – March 2008
Funding $600,000, Fall 2008 – April 2010

29. **The WAM Continuum: Unified Design and Operation for Mobile Wireless Networks**
National Science Foundation
Joint Proposal with M. Ammar (co-PI)
Result: Funded $450,000, August 2008 – July 2011

30. **ARRA: Campus Trials of Enterprise GENI**
BBN System and Technologies
Joint Proposal with R. Clark, N. Feamster (co-PIs)
Result: Funded $252,800, March 2010

b. <u>Pending</u>

1. **Recovery and Transformation of Human Mobility Traces for Mobile Wireless Experimentation**
National Science Foundation
Joint Proposal with M. Ammar (co-PI)
Amount requested: $500,000 in December 2010

F. <u>Research Proposals and Grants (Contributor)</u>

1. **Low-Cost Electronic Packaging**
Engaging Research Center, National Science Foundation
Amount Requested: $2M, Fall 1993
Result: Funded $2M, Fall 1994
Contribution: Member of Systems Integration thrust area; speaking during Industrial and NSF site visit.

2. **Distributed Laboratories**
CISE Research Infrastructure Program
Amount Requested: $1,320,833, Fall 1994

Result: Funded $1M, Spring 1995
Contribution: Participating Investigator; organized demonstrations during NSF site visit.

G. Research Honors and Awards

1. IEEE Fellow, Fall 2010
2. DARPA Active Networks Coordination Award, December 2000.
3. Edenfield Faculty Fellowship, College of Computing, 2000.
4. College of Computing Outstanding Junior Faculty Research Award, 1997.
5. National Science Foundation CAREER Award, 1995.
6. Dissertation nominated by Washington University for ACM Dissertation Award, 1993.

III. SERVICE

A. Professional Activities
A.1. Membership and Activities in Professional Societies

1. Member Institute of Electrical and Electronics Engineers (IEEE), IEEE Computer Society, IEEE Communications Society, Association of Computing Machinery (ACM) and ACM SIGCOMM.
2. Member of ACM Data Networking Curriculum Committee, 1997-1998.

A.2. Conference Committee Activities [incomplete]

1. Program Committee Co-Chair, ACM SIGCOMM 2004
2. Program Committee Co-Chair, IEEE ICNP 2003
3. Program Committee, IEEE INFOCOM 1994-1998, 2000-2004, 2006
4. Program Committee, IEEE International Conference on Network Protocols (ICNP) 1997-2000, 2003
5. Executive Committee (Publicity Chair), IEEE International Conference on Network Protocols (ICNP) 1997
6. Executive Committee (Co-chair, Student Travel Award Committee), ACM SIGCOMM Conference 1997

7. Executive Committee (Tutorials Chair), ACM SIGCOMM Conference 1999

8. Co-chair for 2nd Workshop on Internet Server Performance, 1999

9. Program Committee, ACM SIGCOMM Conference 1999-2004, 2006, 2008, 2011

10. Program Committee, ACM SIGMETRICS Conference 1999-2000, 2003

11. Program Committee, IEEE OpenArch 2000, 2001

12. Program Committee, International Conference on Peer-to-Peer Systems (IPTPS) 2003

13. Program Committee, ACM Hot Topics in Networks (HotNets) Workshop, 2003-2004

14. Program Committee, USENIX Networked Systems Design and Implementation (NSDI) 2005, 2010

15. Program Committee, CHANTS 2010

16. Executive Committee (General Co-Chair), Information and Communication Technologies for Development (ICTD) 2013

17. Executive Committee (General Co-Chair), ACM Development (DEV) 2013

A.3. Workshops and External Courses

1. Invited Participant, NSF Workshop on Scalable Information Infrastructure, October 1998.

2. Invited Participant, National Academy of Sciences CSTB Workshop on Research Horizons in Networking, January 2001.

3. Tutorial on "Internet Topology Modeling", UCLA Institute for Pure and Applied Mathematics, Program on Large Scale Communication Networks, March 2002.

B. On-campus Georgia Tech Committees [incomplete]

Core Qualifier Review Committee, College of Computing, 1993-1994
Task Force on Core Qualifier Review, College of Computing, 1994
Graduate Committee, College of Computing, 1994-1996
Dean's Advisory Committee, College of Computing, 1995-1996
Undergraduate Curriculum Committee, College of Computing, 1996-1997
Space Task Force, College of Computing, 1996-1997

PhD Admissions Committee, College of Computing, 1997-1998
Ad-hoc Undergraduate Curriculum Committee, College of Computing, 1997-1998
Faculty Recruiting Committee, College of Computing, 1999-2000
Yamacraw Design Center Building Programming Committee, 2000-2002
Klaus Building Programming Committee, 2001-2006
Honorary Degree Nominating Committee, 2002-2006
Task Force to Restructure Computing and Networking Services, Fall 2005
Ad-hoc Committee on the School of Computational Science and Engineering, Fall 2006
Search Committee, Dean of College of Sciences, 2006-2007
Search Committee, Dean of Libraries, Spring 2008
Library Faculty Advisory Committee (Chair), 2007-present

C. External Member of Ph.D. Examining Committees

Ph.D. Examining Committees – Georgia Tech (not up to date)

Name	College/School	Advisor	Defense Date
B. Yi	Computing	Prof. G. Neiger	December 1993
P. Scholander	ECE	Prof. H. Owen	February 1995
R. Clark	Computing	Prof. M. Ammar	May 1995
W.B. Park	ECE	Prof. H. Owen	November 1996
W. Lacy	ECE	Prof. S. Wills	December 1996
C. Autry	ECE	Prof. H. Owen	May 1997
K. Almeroth	Computing	Prof. M. Ammar	June 1997
R. Talpade	Computing	Prof. M. Ammar	September 1997
V. Garg	ECE	Prof. D. Schimmel	September 1997
D. Sala	ECE	Prof. J. Limb	February 1998
H. Uzunalioglu	ECE	Prof. I Akyildiz	May 1998
X. Li	Computing	Prof. M. Ammar	June 1998
J. Inwhee	ECE	Prof. I Akyildiz	July 1998
P. May	ECE	Prof. S. Wills	May 1999
Z. Fei	CoC	Prof. M. Ammar	April 2000
R. West	CoC	Prof. K. Schwan	June 2000
X. Wang	ECE	Prof. J. Copeland	November 2000
P. Torab	ECE	Prof. E. Kamen	November 2000
J. McNair	CoC	Prof. I. Akyildiz	November 2000
V. Vellanki	CoC	Prof. A. Chervenak	March 2001
G. Riley	CoC	Ammar/Fujimoto	May 2001
R. Hutchins	CoC	Enslow	May 2001
L. Clay	CoC	Prof. M. Ammar	August 2002
P. Judge	CoC	Prof. M. Ammar	April 2002

External Member of Ph.D. Examining Committees

Name	College/School	Advisor	Defense Date
S. Scott	Washington University (CS)	Prof. S. Goldman	July 1998
J. Gao	Carnegie Mellon (CSD)	Prof. P. Steenkiste	Fall 2004

D. Consulting and Advisory Appointments

Timeplex, Inc., Simulation of ATM architectures. Summer 1993.

NASA Lewis, Current and emerging Internet research and technology. August 1997

Scientific Systems Co., Active networking consulting. Fall 1997-Spring 1998

Growth Networks, Inc., Scalable switching systems. Fall 1999-Winter 2000.

Sutherland, Asbill and Brennen, LLP. Expert witness consulting. 2004-2005.

Duane Morris, LLP. Expert witness consulting. 2005.

Washington University, Department of Computer Science Advisory Board, 2005-present

National Science Foundation, Computer and Information Science and Engineering (CISE) Advisory Board, 2005-2009

CRA GENI Community Advisory Board, Fall 2006

CRA Interim Computing Community Consortium Council, Fall 2006

Co-chair CRA GENI Science Council, Spring 2007-Spring 2008

Co-chair then Chair CRA Networking Science and Engineering Research Council, Spring 2008-Fall 2009

Kilpatrick Stockton, LLP. Expert witness consulting. 2009

Wilmer Hale, LLP. Expert witness consulting. 2011

E. Research Project Reviewer

National Science Foundation, 1995-present
CRA Distributed Mentor Project, 1996, 2000
Southern Technology Council, Innovation Alabama Program, 1998

IV. NATIONAL AND INTERNATIONAL PROFESSIONAL RECOGNITION

A. Honors and Awards

1. DARPA Coordination Award, December 2000.

2. GT College of Computing Dean's Award, May 2002

3. GT College of Computing Dean's Award, May 2003

4. GT College of Computing Faculty Mentor Award, May 2010

B. Patents

1. "Cross-connect multirate/multicast SDH/SONET rearrangement procedure and cross-connection using same," W. B. Park, E. Zegura and H. Owen. Submitted November 1996.

2. "System and method for data streaming." J. Xu, J., E. Zegura, A. Kumar, and M. Sung, Patent pending, filed in June 2006 by Georgia Institute of Technology.

C. Editorial and Reviewer Work for Technical Journals and Publishers

1. Editorial Board, Journal of High Speed Networks, 1996-1999

2. Editorial Board, IEEE/ACM Transactions on Networking, 1999-2002

3. Editor-in-Chief, IEEE/ACM Transactions on Networking, 2002-2004

4. Reviewer for IEEE Transactions on Computers, IEEE Transactions on Communications, CM/IEEE Transactions on Networking, IEEE Transactions on Parallel and Distributed Systems, Performance Evaluation, Computer Networks and ISDN Systems, Morgan Kaufmann Publishers, Addison Wesley Publishers.

V. OTHER CONTRIBUTIONS
A. Seminar Presentations

1. Columbia University, New York, NY, March 1993. "Design and Analysis of Practical Switching Networks."

2. University of Virginia, Charlottesville, VA, March 1993. "Design and Analysis of Practical Switching Networks."

3. Stanford University, Palo Alto, CA, April 1993. "Design and Analysis of Practical Switching Networks."

4. 2nd Workshop on ATM: Real Choices, Baltimore, MD, November 1994. "Implementation

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Complexity of ATM Switch Architectures."

5. Hughes Network Systems, Gaithersburg, MD, October 1995. "Implementation Complexity of ATM Switch Architectures."

6. University of Wisconsin, Madison, WI, February 1996. "How to Model an Internetwork."

7. University of California, Berkeley, CA, April 1996. "How to Model an Internetwork."

8. Harvard University, Cambridge, MA, February 1997. "Improving the Quality of Best-Effort Service."

9. Intel Corporation, Portland, OR, August 1997. "CANEs: Composable Active Network Elements."

10. University of Missouri, Kansas City, MO, October 1997. "Improving Replicated Service with Application-Layer Anycasting."

11. University of Pennsylvania, Philadelphia, PA, May 1998. "Application-aware Network Services."

12. Carnegie Mellon University, Pittsburgh, PA, April 2002. "The SOREN Project: Server Selection in Emerging Environments."

13. UCLA Institute for Pure and Applied Mathematics, Concluding Conference on Large Scale Communication Networks, "New Directions and Half-Baked Ideas in Topology Modeling." Los Angeles, CA, June 2002.

14. Yale University, New Haven, CT, April 2004, "Message Ferrying: Communication in Sparsely-Connected Networks."

15. University of Pennsylvania, Philadelphia, PA, October 2004, "Mobility-Assisted Communication in Challenged Networks."

16. CRAW Distinguished Lecture, University of Wisconsin, Madison, WI, November 2004, "Mobility-Assisted Communication in Challenged Networks."

17. Invited Lecture, University of Kentucky, Lexington, KY, April 2005, "Can You Hear Me? Disruption Tolerant Network Design and Services."

18. EURO NGI Next Generation Internet Networks Conference, April 2005, Invited Talk, "The Royal Carriage: Content Distribution in the Internet"

19. STIC - Bi-annual meeting of three French IT national networks, November 2006, Invited Talk, "FINDing a GENI in a CCCastle"

Declaration of Dr. Ellen W. Zegura
APPENDIX B
Priority Provisional Claim Chart for '065 Patent

Claims	'898 Provisional Application
1. A computer program product embodied on a computer readable storage medium for processing network accounting information comprising:	*See generally* AMDOCS0630535-65.
computer code for receiving from a first source a first network accounting record;	*See*, *e.g.*, AMDOCS0630542-47; AMDOCS0630549; AMDOCS0630553-54; AMDOCS0630561.
computer code for correlating the first network accounting record with accounting information available from a second source; and	*See*, *e.g.*, AMDOCS0630543; AMDOCS0630550-51.
computer code for using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.	*See*, *e.g.*, AMDOCS0630543; AMDOCS0630550-52; AMDOCS0630562.
2. The computer program product embodied on a computer readable storage medium of claim 1, wherein the enhancement is based on a policy.	*See*, *e.g.*, AMDOCS0630558-59.
3. The computer program product embodied on a computer	*See*, *e.g.*, AMDOCS0630544; AMDOCS0630553-54;

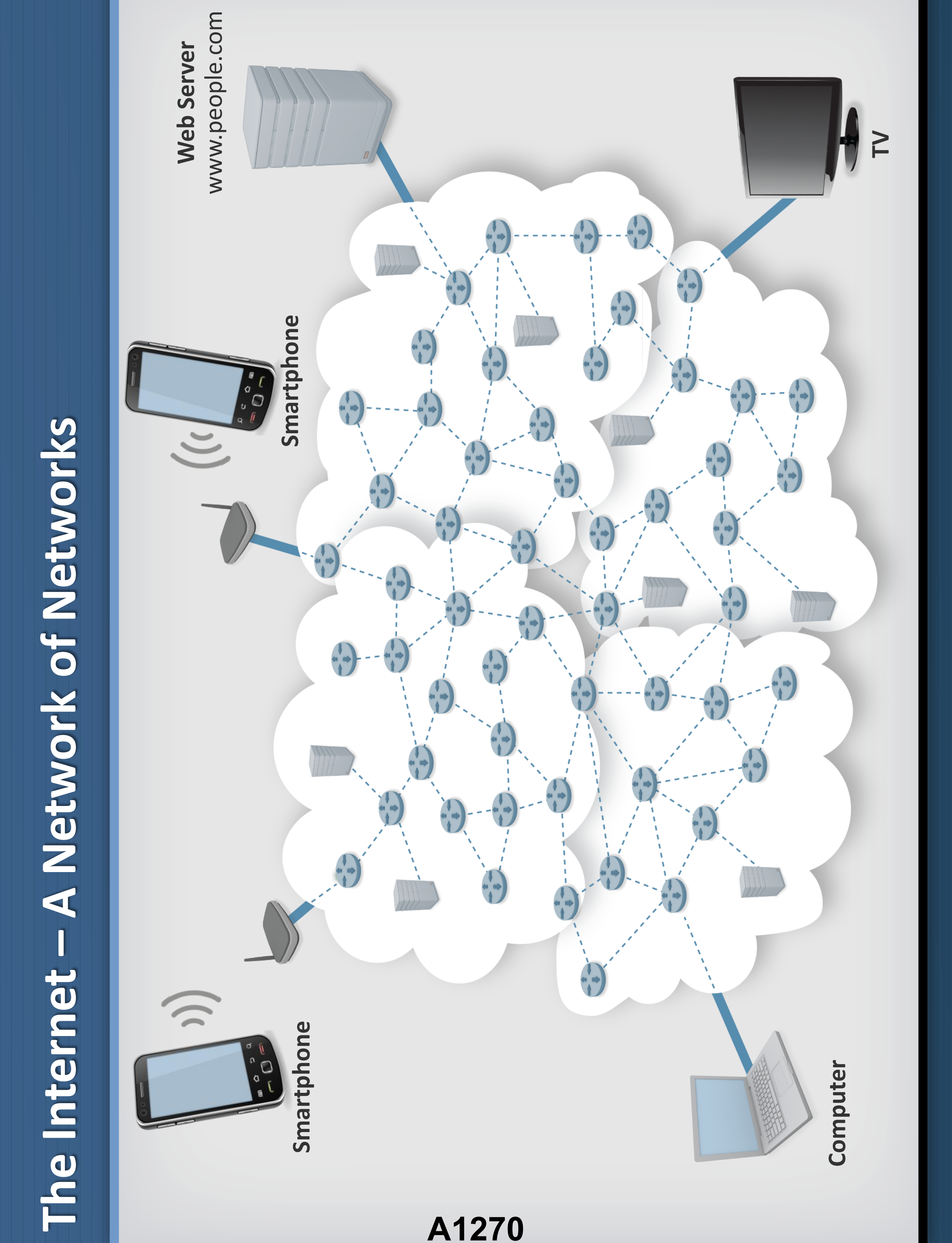
Claims	'898 Provisional Application
readable storage medium of claim 2, wherein the accounting information includes parameters and wherein the using comprises adding at least one parameter from the accounting information to the first network accounting record.	AMDOCS0630559.
4. The computer program product embodied on a computer readable storage medium of claim 3, wherein the accounting information is in the form of a second network accounting record.	*See, e.g.*, AMDOCS0630542-43; AMDOCS0630547; AMDOCS0630550-51; AMDOCS0630553-54; AMDOCS0630561.
7. A method of processing network accounting information comprising:	*See generally* AMDOCS0630535-65.
receiving from a first source a first network accounting record;	*See, e.g.*, AMDOCS0630542-47; AMDOCS0630549; AMDOCS0630553-54; AMDOCS0630561.
correlating the first network accounting record with accounting information available from a second source; and	*See, e.g.*, AMDOCS0630543; AMDOCS0630550-51.
using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.	*See, e.g.*, AMDOCS0630543; AMDOCS0630550-52; AMDOCS0630562.

Claims	'898 Provisional Application
13. A system for collecting data from network entities for a data consuming application, comprising:	*See generally* AMDOCS0630535-65.
a plurality of data collectors to receive information from the network entities and to produce records based on the information, each data collector in the plurality of data collectors being associated with and coupled to a different one of the network entities; and	*See*, *e.g.*, AMDOCS0630542-49; AMDOCS0630553-54; AMDOCS0630561.
an enhancement component that augments data in one of the records produced by one of the plurality of data collectors with data from a different one of the records produced by another of the plurality of data collectors.	*See*, *e.g.*, AMDOCS0630543; AMDOCS0630550-52; AMDOCS0630562.
17. The system of claim 13, further comprising: a module coupled to the plurality of data collectors, the module receives the records produced by the plurality of data collectors for aggregation purposes, and wherein the enhancement component resides in the module.	*See*, *e.g.*, AMDOCS0630543; AMDOCS0630550-51.

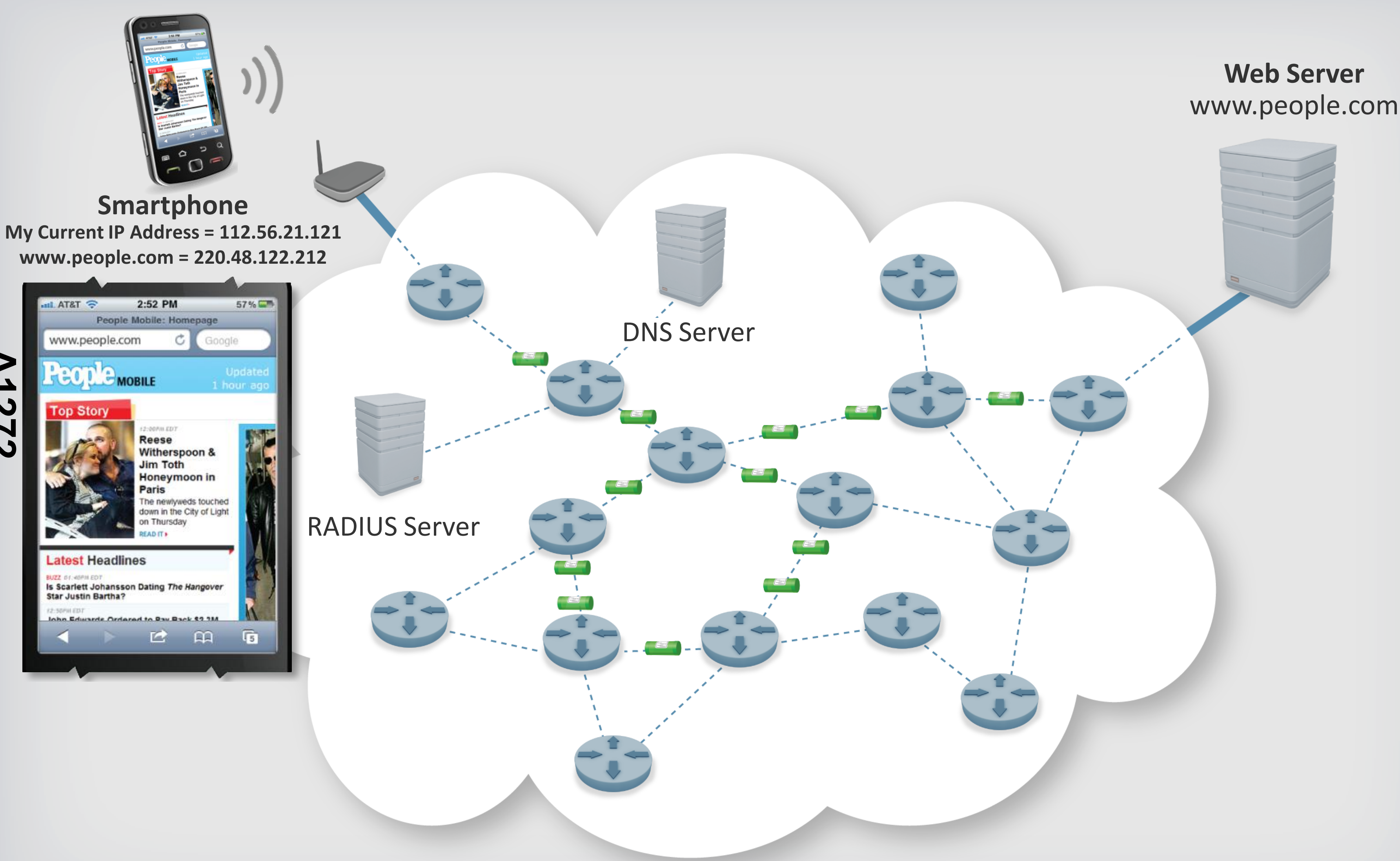
Amdocs (Israel) Limited

v.

Openet Telecom, Inc. et al.


The Internet – A Network of Networks
Web Server
www.people.com
TV
Smartphone
Smartphone
Computer
5

The Internet – How Web Browsing Works



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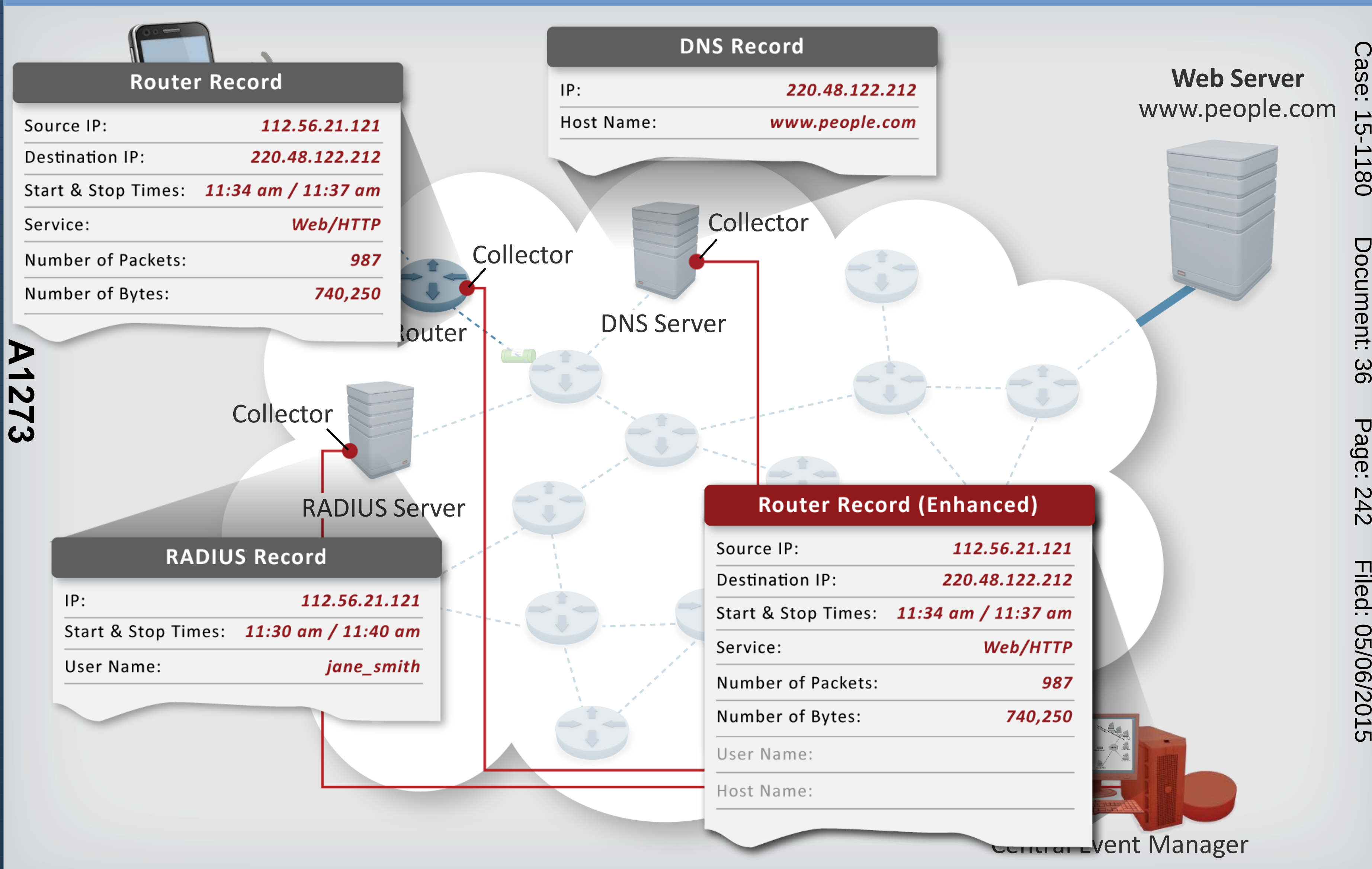

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UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff,	.	Civil Action No. 1:10cv910
vs.	.	Alexandria, Virginia July 25, 2011 10:00 a.m.
OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation, Defendants.	.	

TRANSCRIPT OF MOTIONS HEARING
BEFORE THE HONORABLE LEONIE M. BRINKEMA
UNITED STATES DISTRICT JUDGE

APPEARANCES:

FOR THE PLAINTIFF:
S. CALVIN WALDEN, ESQ.
NELS T. LIPPERT, ESQ.
Wilmer Cutler Pickering Hale and Dorr LLP
399 Park Avenue
New York City, NY 10022
and
GREGORY H. LANTIER, ESQ.
Wilmer Cutler Pickering Hale and Dorr LLP
1875 Pennsylvania Avenue, N.W.
Washington, D.C. 20006

FOR THE DEFENDANTS:
JAMES H. WALLACE, JR., ESQ.
ANTHONY H. SON, ESQ.
BRIAN H. PANDYA, ESQ.
Wiley Rein LLP
1776 K Street, N.W.
Washington, D.C. 20006

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COMPUTERIZED TRANSCRIPTION OF STENOGRAPHIC NOTES

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MR. WALDEN: Okay.

THE COURT: Very -- as concretely as you can.

MR. WALDEN: Certainly, Your Honor. First, the -- let's turn to slide --

THE COURT: Now whose slide, the defendants'?

MR. WALDEN: No, it's Amdocs' slide. I'm sorry. We do have some thoughts on DSD that we put into our slides.

THE COURT: All right.

MR. WALDEN: I'm sorry, we'll start with slide 29.

THE COURT: All right, we have it.

MR. WALDEN: This is again from a document that comes from Amdocs' -- I'm sorry, from Openet's own production, and this describes this DSD, Data Stream Decoder Rule. This describes as the internal scripting language used --

THE COURT: Hold on.

MR. WALDEN: Excuse me.

THE COURT: All right, go ahead. Go ahead.

MR. WALDEN: DSD is described by Openet as, "The internal scripting language used by Openet Telecom. The rules of the FusionWorks system are expressed using this scripting language.

"Rules are written in Openet's proprietary DSD language, which is the internal scripting language of Openet's Framework. Rules are written to control data handling behavior of collectors and plug-ins, to create business logic specific to a customer's

"Answer: Correct."

Now, Your Honor, we've cited to you the *Finjan* case as well as the *Intel* case and other cases which stand for the proposition that if the claims are written in a particular manner, especially apparatus claims, including in the *Finjan* case specifically software for performing a particular function, that -- those claims are infringed by that software when it's delivered or when it's sold, and it doesn't have to be used in any particular manner.

In fact, in the *Finjan* case, the software was locked when they sold it. The user of the -- the buyer of the software could not use it until they further bought a key. The *Finjan* court, the Federal Circuit in that case held that that sale of that locked software was an infringing sale because the claims required code for performing particular functions, and the software was on that disc that contained code for performing those particular functions, and further, the court noted you don't need to further modify the code.

That's the same here. The code in the Framework software is delivered. Yes, you need to set up DSD rules so that it will operate for a particular customer, but that code when it is sold and when it is delivered, it is on the disc, and it is there for performing the functions that are shown in the patent-in-suit, and we can go through the particular limitations and show you how that is and where that is.

And then finally, the undisputed evidence is that the user, AT&T or Verizon, does not need to modify that code to perform those functions. It's not the situation where it's a Microsoft computer that's just sitting there doing nothing. These discs, by the way, cost well over a hundred thousand dollars. It's not that they don't have anything on them. They have hundreds of files for performing these functions. They have plug-ins, they have the correlator engine, they have the reporting software. It's all there waiting to be unlocked, and all you need to do is write scripts to do that. And so under the *Finjan* case, especially for the apparatus claims, we have solid evidence of infringement. We don't need the DSD code.

Now, for the method claims, we do have DSD code. Method claims are infringed through our use, and so we've shown that these softwares, as you note, aren't just sold to do nothing. They're sold to do something.

And Mr. Wallace said, "We -- no question that we supplied DSD code." Well, that's right. We've seen it. We've cited it. Our expert has, has given opinions on DSD code. She gave an entire supplemental report, couldn't put it in her first report because we hadn't had the DSD code at that time, but she put in a supplemental report showing DSD code, specific implementations at Verizon, Time Warner Cable, and Sprint -- I'm sorry, and AT&T.

So our view is that this whole -- the issue of DSD is

something of a red herring, because again, the infringing software is on, is on the Framework CD that gets sold, and the DSD code is, in fact, delivered by Openet to customers, and this software is out there right now performing the functions that we claim infringe our patents-in-suit.

THE COURT: All right. Do you want to respond?

MR. WALLACE: Your Honor, it really gets back to Excel cannot sue, Your Honor, for infringement of a spreadsheet function if all you have is the Microsoft operating system. You've got to have a spreadsheet code, and the DSD code that would perform these functions has not been supplied to the customers in the United States, and we can address those in the context of the summary judgment patent by patent.

THE COURT: All right, let's do it, because it's your motion for summary judgment on this issue.

MR. WALLACE: Mr. Son will address the summary judgment, Your Honor.

THE COURT: All right.

MR. SON: Good morning, Your Honor.

THE COURT: Good morning.

MR. SON: I'd like to put to rest one issue with respect to whether Dr. Zegura is an expert who could testify regarding the DSD code, because we heard Mr. Walden just now indicate that DSD code, because it is a proprietary language, of course, prior to this litigation, she would not be an expert on that, but the

IN THE UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF VIRGINIA
Alexandria Division

FILED
SEP 27 2012
CLERK, U.S. DISTRICT COURT
ALEXANDRIA, VIRGINIA

AMDOCS (Israel) Limited	)	
	)	
Plaintiff,	)	
	)	
v.	)	1:10cv910 (LMB/TRJ)
	)	
OPENET TELECOM, LIMITED, <u>et al.</u>	)	
	)	
Defendants.	)	

ORDER

For the reasons to be explained in detail in a Memorandum Opinion to be issued in the near future, plaintiff Amdocs (Israel) Limited's Motion for Proposed Claim Constructions and Partial Summary Judgment of No Invalidity and No Inequitable Conduct [Dkt. No. 98] is GRANTED in part to the extent that the construction of certain claims will be made by the Court and GRANTED as to inequitable conduct but DENIED in all other respects because there are material issues of fact in dispute as to the validity of the '065, '510, and '984 patents.

The same Memorandum Opinion will provide the reasons why Openet's Proposed Claim Construction and Motion for Summary Judgment of Non-Infringement and Invalidity [Dkt. No. 95] is GRANTED in part to the extent that the construction of certain claims in the patents at issue will be made by the Court and GRANTED as to non-infringement, but DENIED as to invalidity of

of the '065 patent because there are material issues of fact in dispute as to that issue.

This ruling will leave only the issue of patent invalidity for trial. Accordingly, it is hereby

ORDERED that within fourteen (14) days of receipt of the Memorandum Opinion, the parties meet and confer about whether they want to take the invalidity claims to trial and advise the Court of their decision within that time period.

Because the Court's Markman constructions of various claim terms do not always adopt either of the party's proposed constructions and neither infringement nor inequitable conduct will be an issue at trial, all the pending motions in limine and motions related to the conduct of the trial, docketed as numbers 117, 121, 124, 126, 130, 132, 143, 145, 147, 151, and 232 are DENIED as moot; however, the parties will be allowed to file new or revised versions of these motions if the remaining patent invalidity issues go to trial and the motions remain relevant to those issues.

Given the proprietary nature of materials in the parties motions and their attached exhibits, sealing motions docketed as numbers 105, 138, and 221 are GRANTED, as is the motion docketed as number 212, which requests leave to correct certain document entries.

Openet's Motion to Strike Exhibits 8-10 [Dkt. No. 164] is GRANTED because this Court does not rely on unsworn statements of witnesses and it is too late to correct that defect.

The Clerk is directed not to enter judgment under Fed, R, Civ. P. 58 until the Memorandum Opinion issues and the Court authorizes entry of a final judgment and to forward copies of this Order to counsel of record.

The Clerk is directed to forward copies of this Order to counsel of record.

Entered this 27th day of September, 2012.

Alexandria, Virginia

/s/ LMB
Leonie M. Brinkema
United States District Judge

IN THE UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF VIRGINIA
Alexandria Division

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation,	)	
Plaintiff	)	
v.	)	1:10cv910 (LMB/TRJ)
OPENET TELECOM, INC., a Delaware Corporation, *et al.*,	)	
Defendants.	)	

MEMORANDUM OPINION

Before the Court are defendants Openet Telecom, Inc. and Openet Telecom Ltd.'s Motion for Summary Judgment of Non-Infringement and Invalidity [Dkt. No. 95] and plaintiff Amdocs (Israel) Limited's Motion for Proposed Claim Constructions and Partial Summary Judgment of No Invalidity and No Inequitable Conduct [Dkt. No. 98]. The Court has issued an Order [Dkt. No. 248] that granted both motions in part. This Memorandum Opinion provides the reasoning supporting that decision and supporting the entry of summary judgment in favor of defendants on all claims asserted in plaintiff's First Amended Complaint for Patent Infringement [Dkt. No. 50] and in favor of plaintiff on Openet Telecom, Inc.'s counterclaims for inequitable conduct.

Although there remain disputed issues of material fact as to whether the patents-in-suit are invalid, the Court has determined upon further reflection that in light of its ruling

that the defendants' accused products do not infringe those patents, it would be an unnecessary use of limited judicial resources to proceed with the invalidity issues. Accordingly, the part of the Order issued on September 27, 2012, that gave defendants the option to pursue their invalidity claims will be vacated and the invalidity claims will be dismissed without prejudice.

I. BACKGROUND

A. The Parties

The plaintiff, Amdocs (Israel) Limited ("Amdocs"), is an Israeli corporation and a subsidiary of Amdocs Limited. Amdocs sells telecommunications providers a software portfolio that enables such providers to track their customers' usage of various network services, including web browsing, e-mail, and SMS messaging, and to account for and bill for that usage. See Mem. in Supp. of Amdocs (Israel) Limited's Mot. for Proposed Claim Constructions and Partial Summ. J. ("Pl.'s Mot. for Partial Summ. J.") at 2. Included in Amdocs' portfolio is "mediation" software, which the parties describe as software that collects and processes the data records documenting customers' network usage. See id. This software was originally developed by XaCCT Technologies, Inc. ("XaCCT"), which Amdocs acquired in 2004. See id. Through that acquisition, Amdocs also obtained ownership of the patents-in-suit, which "stem from

development of mediation products at XaCCT in the 1997 time-frame." Id. at 3.

The defendants, Openet Telecom, Inc., a Delaware Corporation, and Openet Telecom, Ltd., an Irish Corporation (collectively, "Openet"), form a "small Irish company with U.S. headquarters in Reston, Virginia" that develops and sells the FusionWorks brand of mediation software to telecommunications companies. Defs.' Mem. in Supp. of Openet's Proposed Claim Constructions and Mot. for Summ. J. of Non-Infringement and Invalidity ("Defs.' Mot. for Summ. J.") at 2. Openet offers many products under the FusionWorks brand, including Convergent Mediation, Convergent Charging, Network-Edge Rating, Balance Manager, Profile Manager, and Policy Manager, all of which are built on an underlying platform called the "FusionWorks Framework." See Pl.'s Mot. for Partial Summ. J. at 2; Decl. of Joseph Hogan [Dkt. No. 97] ¶¶ 4-14.

B. The Patents-in-Suit

At issue in this litigation are four related patents owned by Amdocs, specifically U.S. Patent Nos. 6,836,797 ("the '797 patent"); 6,947,984 ("the '984 patent"); 7,412,510 ("the '510 patent"); and 7,631,065 ("the '065 patent"). Amdocs accuses Openet of infringing:

- Independent claims 1, 7, and 19, and dependent claims 2 and 8 of the '797 patent;

- Independent claims 1, 7, and 13, and dependent claims 4 and 17 of the '065 patent;
- Independent claim 16 and dependent claims 17 and 19 of the '510 patent; and
- Independent claims 1 and 13, and dependent claims 2, 6, and 8 of the '984 patent.

See Am. Compl. [Dkt. No. 50] ¶¶ 19-29; Joint Statement of Stipulated Undisputed Facts [Dkt. No. 80] ¶¶ 5, 7, 9, 11.

On November 18, 1999, inventors Limor Schweitzer, Eran Wagner, and Tal Givoly filed Application Number 09/442,876 with the Patent and Trademark Office (PTO). The application claimed priority from two earlier provisional applications, one filed on November 20, 1997, and the other on November 19, 1998, as well as from a Patent Cooperation Treaty application filed on November 20, 1998. The application was granted and U.S. Patent No. 6,418,467 ("the '467 patent") was issued on July 9, 2002. That patent, titled "NETWORK ACCOUNTING AND BILLING SYSTEM AND METHOD," is comprised of a single claim for "[a] method for billing and charging for network usage" through a lengthy series of steps and substeps. Although the '467 patent is not one of the patents-in-suit, each of the four patents-in-suit was filed as a continuation or a continuation-in-part[1] of the application

[1] A continuation application "is a second application for the same invention claimed in a prior nonprovisional application and filed before the original application becomes abandoned or patented." Manual of Patent Examining Procedure § 201.07 (8th ed., rev. 9, 2012). Moreover, "[t]he disclosure presented in the continuation must be the same as that of the original

that became the '467 patent; specifically, the '797 patent was filed as a continuation-in-part, the '065 and '984 patents were filed as continuations, and the '510 patent was filed as a continuation of the '984 patent.

All of these patents claim parts of a system that is designed to solve an accounting and billing problem faced by network service providers.[2] See Defs.' Ex. A ('797 patent) at 1:50-52; Defs.' Ex. B ('984 patent) at 1:57-2:17; Defs.' Ex. C ('510 patent) at 1:57-2:25; Defs.' Ex. D ('065 patent) at 1:54-

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application; i.e., the continuation should not include anything which would constitute new matter if inserted in the original application." Id.

A continuation-in-part application "is an application filed during the lifetime of an earlier nonprovisional application, repeating some substantial portion or all of the earlier nonprovisional application and adding matter not disclosed in the said earlier nonprovisional application." Id. § 201.08 (emphasis in original).

The benefit these continuing applications provide the patentee is that claims in such applications containing "matter disclosed in the parent application [are] entitled to the benefit of the filing date of the parent application." Applied Materials, Inc. v. Advanced Semiconductor Materials Am., Inc., 98 F.3d 1563, 1580 (Fed. Cir. 1996) (quoting Waldemar Link, GmbH & Co. v. Osteonics Corp., 32 F.3d 556, 558 (Fed. Cir. 1994)); see also 35 U.S.C. § 120.

[2] Although the parties provide mediation software to telecommunications providers, the patents-in-suit address billing problems faced by the broader set of network service providers. This distinction does not have any significance for this opinion.

2:21.[3] Customers of network service providers often use several distinct services, such as e-mail, voice over Internet Protocol, or streaming audio or video, on the same computer network. See Defs.' Ex. A ('797 patent) at 1:20-37; Defs.' Ex. B ('984 patent) at 1:37-48; Defs.' Ex. C ('510 patent) at 1:46-57; Defs.' Ex. D ('065 patent) at 1:42-53. Because some services require more bandwidth than others, network service providers "would like to price their available bandwidth according to a user's needs," for example by billing business customers "according to their used bandwidth at particular qualities of service." Defs.' Ex. B ('984 patent) at 1:43-48; Defs.' Ex. C ('510 patent) at 1:52-57; Defs.' Ex. D ('065 patent) at 1:48-53. The raw usage logs for these services, however, are generated by several different network devices that may exist in different network levels. See Defs.' Ex. A ('797 patent) at 1:38-53; Defs.' Ex. B ('984 patent) at 1:62-2:21; Defs.' Ex. C ('510 patent) at 1:66-2:25; Defs.' Ex. D ('065 patent) at 1:62-2:21. The patented system collects these raw usage data records from their diffuse locations throughout the network and through appropriate filtering, aggregation, correlation, and enhancement transforms them into a format suitable for accounting, called "detail records" ("DRs"). See Defs.' Ex. A ('797 patent) at

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[3] Both parties attached the patents-in-suit as exhibits to their motions. For consistency and because the defendants filed their motion first, the patents will be cited as defendants' exhibits.

5:23-26; Defs.' Ex. B ('984 patent) at 3:12-15; Defs.' Ex. C ('510 patent) at 3:43-46; Defs.' Ex. D ('065 patent) at 3:40-43. These DRs can then be stored in a central repository for generating "auditing, accounting and billing reports" or "can be sent directly to other systems," including billing systems. Defs.' Ex. D ('065 patent) at 2:29-33; Defs.' Ex. C ('510 patent) at 2:33-37; see also Defs.' Ex. A ('797 patent) at 12:31-33; Defs.' Ex. B ('984 patent) at 2:33-34.

1. The '065 Patent

The '065 patent describes the invention's primary function, which is the collection and transformation of network accounting records. Amdocs accuses Openet's products of infringing the following claims of the '065 patent:

> 1. A computer program product embodied on a computer readable storage medium for processing network accounting information comprising:
> computer code for receiving from a first source a first network accounting record;
> computer code for correlating the first network accounting record with accounting information available from a second source; and
> computer code for using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.
>
> 4. The computer program product embodied on a computer readable storage medium of claim 3,[4] wherein the

[4] Although Amdocs is not asserting claims 2 and 3, these claims are incorporated by reference because Amdocs is asserting claim 4, which is dependent on claim 3, which is in turn dependent on claim 2. Claims 2 and 3 provide:

accounting information is in the form of a second network accounting record.

7. A method of processing network accounting information comprising:

receiving from a first source a first network accounting record;

correlating the first network accounting record with accounting information available from a second source; and

using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.

13. A system for collecting data from network entities for a data consuming application, comprising:

a plurality of data collectors to receive information from the network entities and to produce records based on the information, each data collector in the plurality of data collectors being associated with and coupled to a different one of the network entities; and

an enhancement component that augments data in one of the records produced by one of the plurality of data collectors with data from a different one of the records produced by another of the plurality of data collectors.

17. The system of claim **13**, further comprising:

a module coupled to the plurality of data collectors, the module receives the records produced by the plurality of data collectors for

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2. The computer program product embodied on a computer readable storage medium of claim **1**, wherein the enhancement is based on a policy.

3. The computer program product embodied on a computer readable storage medium of claim **2**, wherein the accounting information includes parameters and wherein the using comprises adding at least one parameter from the accounting information to the first network accounting record.

Defs.' Ex. D ('065 patent) at 16:15-22.

aggregation purposes, and wherein the enhancement component resides in the module.

Defs.' Ex. D ('065 patent) at 16:4-14, 16:37-46, 16:63-17:6, 17:18-22.

2. The '984 and '510 Patents

The '984 patent and the '510 patent, which is a continuation of the '984 patent, describe methods and computer program products for creating reports based on the generated DRs, and for sending alerts based on those reports. The asserted claims also include limitations that describe in detail the core collection and conversion of network usage records. Specifically, the claims of the '984 patent at issue provide:

1. A method for reporting on the collection of network usage information from a plurality of network devices, comprising:

(a) collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers utilizing multiple gatherers each including a plurality of information source modules each interfacing with one of the network devices and capable of communicating using a protocol specific to the network device coupled thereto, the network devices selected from the group consisting of routers, switches, firewalls, authentication servers, web hosts, proxy servers, netflow servers, databases, mail servers, RADIUS servers, and domain name servers, the gatherers being positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network;

(b) filtering and aggregating the network communications usage information;

(c) completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;
(d) storing the plurality of data records in a database;
(e) allowing the selection of one of a plurality of reports for reporting purposes;
(f) submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices; and
(g) outputting a report based on the queries.

2. A method as recited in claim **1**, and further comprising submitting network activity queries to the database utilizing the selected reports for retrieving information on activity of the network.

6. A method as recited in claim **2**, and further comprising generating an alert upon the occurrence of an event.

8. A method as recited in claim **6**, wherein the alert indicates that services should be ceased.

13. A computer program product embedded into computer readable medium for reporting on the collection of network usage information from a plurality of network devices, comprising:

(a) computer code for collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers utilizing multiple gatherers each including a plurality of information source modules each interfacing with one of the network devices and capable of communicating using a protocol specific to the network device coupled thereto, the network devices selected from the group consisting of routers, switches, firewalls, authentication servers, web hosts, proxy servers, netflow servers, databases, mail servers, RADIUS servers, and domain name servers, the gatherers being positioned on a segment of the network on which the network

devices coupled thereto are positioned for minimizing an impact of the gatherers on the network;

(b) computer code for filtering and aggregating the network communications usage information;

(c) computer code for completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;

(d) computer code for storing the plurality of data records in a database;

(e) computer code for allowing the selection of one of a plurality of reports for reporting purposes;

(f) computer code for submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices; and

(g) computer code for outputting a report based on the queries.

Defs.' Ex. B ('984 patent) at 15:31-67, 16:11-12, 16:15-16, 16:25-61. The following three claims of the '510 patent are at issue in this litigation:

> 16. A computer program product stored in a computer readable medium for reporting on a collection of network usage information from a plurality of network devices, comprising:
>
> computer code for collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers;
>
> computer code for filtering and aggregating the network communications usage information;
>
> computer code for completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;
>
> computer code for storing the plurality of data records in a database;

computer code for submitting queries to the database utilizing predetermined reports for retrieving information on the collection of the network usage information from the network devices; and

computer code for outputting a report based on the queries;

wherein resource consumption queries are submitted to the database utilizing the reports for retrieving information on resource consumption in a network; and

wherein a resource consumption report is outputted based on the resource consumption queries.

17. A computer program product as recited in claim **16**, and further comprising computer code for submitting network activity queries to the database utilizing the reports for retrieving information on the activity of the network.

19. A computer program product as recited in claim **16**, and further comprising computer code for generating an alert upon occurrence of an event.

Defs.' Ex. C ('510 patent) at 17:3-33, 18:4-6.

3. The '797 Patent

The '797 patent has a different focus than the other three patents-in-suit, by concentrating on the structure of the DRs. Specifically, the asserted claims are:

1. A method for generating a single record reflecting multiple services for accounting purposes, comprising:

(a) identifying a plurality of services carried out over a network;

(b) collecting data describing the plurality of services; and

(c) generating a single record including the collected data, wherein the single record represents each of the plurality of services.

2. The method as recited in claim **1**, and further comprising sending the single record to a Business Support System.

7. A computer program product embedded into computer readable medium for generating a single record reflecting multiple services for accounting purposes, comprising:

(a) computer code for identifying a plurality of services carried out over a network;

(b) computer code for collecting data describing the plurality of services; and

(c) computer code for generating a single record including the collected data, wherein the single record represents each of the plurality of services;

wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;

wherein the data is collected utilizing an enhancement procedure defined utilizing a graphic user interface by listing a plurality of available functions to be applied in real-time prior to end-user reporting,

allowing a user to choose at least one of a plurality of fields, and

allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.

8. The computer program product as recited in claim 7, and further comprising computer code for sending the single record to a Business Support System.

19. A method for generating a single record reflecting multiple services, comprising:

(a) collecting data with different formats describing a plurality of services, wherein the services are selected from the group consisting of an hypertext transfer protocol (HTTP) session, electronic mail session, a multimedia

streaming session, and voice over Internet Protocol (IP) session;
(b) collecting data with different formats describing users of the services;
(c) generating a single record including the collected data representing each of the services and the users;
(d) collecting a plurality of the single records;
(e) generating a distinct record including the collected data of each of the single records, wherein the distinct record represents each of the plurality of single records; and
(f) sending the distinct record to a Business Support System.

Defs.' Ex. A ('797 patent) at 16:30-39, 16:52-17:15, 18:26-46.

C. **Procedural History**

On August 16, 2010, Amdocs instituted this civil action, alleging that Openet's products, including the FusionWorks mediation software, infringed the '797 and '065 patents. See Compl. ¶¶ 16, 21. After Openet responded with defenses and counterclaims, including allegations of invalidity and non-infringement, see Dkt. Nos. 9, 10, both parties requested and were granted leave to file amended pleadings. See Dkt. Nos. 43, 57, 58.

The First Amended Complaint for Patent Infringement, filed on February 3, 2011, added claims that the '984 and '510 patents are also being infringed by Openet's products, including the FusionWorks mediation software. Am. Compl. ¶¶ 24-29 (Counts III and IV). Among other forms of relief, Amdocs seeks damages, including treble damages for willful infringement, a permanent

injunction prohibiting future infringement, pre-judgment and post-judgment interest, and expenses, costs, and attorneys' fees. See id. at 6-7.

Openet's amended response added the defense and counterclaim of unenforceability for inequitable conduct; these defenses and counterclaims were subsequently included in Openet's final responsive pleading, filed in response to Amdocs' amended complaint on February 22, 2011. See Openet Telecom, Inc.'s First Am. Answer to Pl. Amdocs (Israel) Limited's Compl. for Patent Infringement [Dkt. No. 51] ¶¶ 32-33, 49-75 (Countercls. V & VI); Openet Telecom Ltd.'s First Am. Answer to Pl. Amdocs (Israel) Limited's Compl. for Patent Infringement [Dkt. No. 52] ¶¶ 32-56; Openet Telecom, Inc.'s Answer and Countercls. to Pl.'s First Am. Compl. for Patent Infringement ("Openet Inc.'s Answer") [Dkt. No. 55] ¶¶ 42-45; id. ¶¶ 69-99 (Countercls. IX and X); Openet Telecom, Ltd.'s Answer to Pl.'s First Am. Compl. for Patent Infringement ("Openet Ltd.'s Answer") [Dkt. No. 56] ¶¶ 42-70.[5]

In its Motion for Summary Judgment of Non-Infringement and Invalidity [Dkt. No. 95], Openet seeks summary judgment in its

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[5] The allegations of inequitable conduct in Openet Inc.'s counterclaims and in Openet Ltd.'s affirmative defenses are identical. Compare Openet Inc.'s Answer ¶¶ 70-81, 83-99; with Openet Ltd.'s Answer ¶¶ 42-53, 54-70. For concision, the rest of this opinion will cite only to Openet Inc.'s counterclaims.

favor on all counts in plaintiff's Amended Complaint, arguing that (1) Amdocs has not come forward with sufficient evidence to establish a genuine dispute of material fact regarding alleged infringement of any of the four patents at issue, and that (2) the '065 patent is invalid because it is anticipated by an earlier patent. Defs.' Mot. for Summ. J. at 1. In its Motion for Proposed Claim Constructions and Partial Summary Judgment of No Invalidity and No Inequitable Conduct [Dkt. No. 98], Amdocs seeks partial summary judgment in its favor on the issues of the validity of the patents-in-suit and the absence of inequitable conduct by Amdocs.[6] Pl.'s Mot. for Partial Summ. J. at 1-2.

The Court has (1) granted Amdocs' Motion for Proposed Claim Constructions and Partial Summary Judgment of No Invalidity and No Inequitable Conduct in part, by finding no inequitable conduct and agreeing to construe certain claims of the patents-in-suit, but denied the motion in all other respects; (2) granted Openet's Proposed Claim Constructions and Motion for Summary Judgment in part, finding that Openet did not infringe any of the asserted claims and agreeing to construe certain terms in the patents-in-suit, but denying it as to invalidity; and (3) withheld judgment under Fed. R. Civ. P. 58 until the

[6] The parties also filed several motions in limine [Dkt. Nos. 115, 117, 119, 121, 124, 126, 128, 130, 132, 134, 136, 139, 141, 143, 145, 147, 151], some of which were granted [Dkt. Nos. 246, 247], and the remainder of which were denied as moot with leave to refile [Dkt. No. 248].

Memorandum Opinion providing the reasoning for the Order issued. Dkt. No. 248.

II. DISCUSSION

A. Standard of Review

Summary judgment is appropriate when the record shows that "there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(a). Although the Court must view the record "in the light most favorable to the nonmoving party," Dulaney v. Packaging Corp. of Am., 673 F.3d 323, 324 (4th Cir. 2012), the "mere existence of a scintilla of evidence in support of the [nonmovant's] position will be insufficient." Anderson v. Liberty Lobby, Inc., 477 U.S. 242, 252 (1986); see also Am. Arms Int'l v. Herbert, 563 F.3d 78, 82 (4th Cir. 2009). Rather, when "the record taken as a whole could not lead a rational trier of fact to find for the nonmoving party, there is no genuine issue for trial." Ricci v. DeStefano, 557 U.S. 557, 586 (2009) (quoting Matsushita Elec. Indus. Co. v. Zenith Radio Corp., 475 U.S. 574, 587 (1986)) (internal quotation mark omitted).

When the nonmoving party bears the burden of proof at trial, the party moving for summary judgment may prevail by showing "an absence of evidence to support" any essential element of the cause of action. Celotex Corp. v. Catrett, 477 U.S. 317, 322-25 (1986); see also Rhodes v. E.I. du Pont de

Nemours & Co., 636 F.3d 88, 94 (4th Cir. 2011). Once the moving party has met its burden of demonstrating that absence, the nonmoving party must "do more than simply show that there is some metaphysical doubt as to the material facts," and must "come forward with specific facts showing that there is a genuine issue for trial." Matsushita, 475 U.S. at 586-87 (internal quotation marks and emphasis omitted). The nonmoving party may present "any of the kinds of evidentiary materials listed in Rule 56(c), except the mere pleadings themselves" and need not "produce evidence in a form that would be admissible at trial." Celotex, 477 U.S. at 324. Nonetheless, evidence submitted in an inadmissible format must be otherwise admissible at trial. See Evans v. Techs. Applications & Serv. Co., 80 F.3d 954, 962 (4th Cir. 1996); Fed. R. Civ. P. 56(c)(1)(B).

B. Claim Construction and Infringement

Courts examine a claim of patent infringement in two steps. First, the court "determin[es] the meaning and scope of the patent claims asserted to be infringed." Markman v. Westview Instruments, Inc., 52 F.3d 967, 976 (Fed. Cir. 1995) (en banc) (citations omitted), aff'd, 517 U.S. 370 (1996). Then, the court "compar[es] the properly construed claims to the device accused of infringing." Id.

In the parties' cross-motions for summary judgment, they dispute the proper construction of a number of terms in each of

the patents-in-suit. The Court will construe only those terms that are necessary to the resolution of the parties' motions. Specifically, the Court will construe the following terms:

- "Enhance" and "enhancement" ('065 patent, claims 1, 7, and 13; '797 patent, claim 7);
- "Completing" ('510 patent, claim 16; '984 patent, claims 1 and 13); and
- "Single record represent[ing] each of the plurality of services" ('797 patent, claims 1, 7, and 19).

Although these terms explicitly appear in only eight of the eighteen asserted claims, the ten remaining claims are dependent on claims in which the terms do appear. The construction of these terms, therefore, determines the interpretation of all of the claims at issue.

Using the proper construction of these terms, the Court concludes for the reasons given below that despite extensive discovery, Amdocs has failed to identify any actual instance of infringement by Openet. Mere speculation is insufficient to allow a civil action to proceed to trial; accordingly, Amdocs' claims of infringement cannot survive summary judgment.

1. Legal Standards

a. Claim Construction

The district court has the "power and obligation to construe as a matter of law the meaning of language used in the patent claim." Markman, 52 F.3d 967 at 979. The "starting point for any claim construction must be the claims themselves."

Ecolab, Inc. v. Paraclipse, Inc., 285 F.3d 1362, 1374 (Fed. Cir. 2002) (quoting Pitney Bowes, Inc. v. Hewlett-Packard Co., 182 F.3d 1298, 1305 (Fed. Cir. 1999)). The inquiry does not end there, however, as "the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." Phillips v. AWH Corp., 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc); see also Schriber-Schroth Co. v. Cleveland Trust Co., 311 U.S. 211, 217 (1940) (noting that "[t]he claims of a patent are always to be read or interpreted in the light of its specifications"). Indeed, the Federal Circuit has emphasized that the specification "is the single best guide to the meaning of a disputed term." Kinetic Concepts, Inc. v. Blue Sky Med. Grp., Inc., 554 F.3d 1010, 1018-19 (Fed. Cir. 2009) (quoting Phillips, 415 F.3d at 1315) (internal quotation marks omitted). Courts may also properly consider the patent's prosecution history, if in evidence. Netcraft Corp. v. eBay, Inc., 549 F.3d 1394, 1397 (Fed. Cir. 2008). Finally, the court may consider extrinsic sources, such as expert testimony or technical dictionaries, only in "the rare circumstance that the court is unable to determine the meaning of the asserted claims" after looking to the three sources of "intrinsic evidence," namely the claim language, the specification, and the prosecution history.

Bell Atl. Network Servs., Inc. v. Covad Commc'ns Grp., Inc., 262 F.3d 1258, 1269 (Fed. Cir. 2001).

A claim term generally must be given the "ordinary and customary meaning" it would have had to "a person of ordinary skill in the art in question at the time of the invention." Phillips, 415 F.3d 1303 at 1312-13. This meaning enjoys a "heavy presumption," but can be overcome "where a claim term deprives the claim of clarity such that there is no means by which the scope of the claim may be ascertained from the language used" or "where the patentee has chosen to be his own lexicographer." Bell Atl., 262 F.3d at 1268 (quoting Johnson Worldwide Assocs., Inc. v. Zebco Corp., 175 F.3d 985, 989-90 (Fed. Cir. 1999)) (internal quotation marks omitted). In particular, "[t]he specification acts as a dictionary when it expressly defines terms used in the claims or when it defines terms by implication." Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996); see also SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc., 242 F.3d 1337, 1344 (Fed. Cir. 2001) ("[T]he written description can provide guidance as to the meaning of the claims, thereby dictating the manner in which the claims are to be construed, even if the guidance is not provided in explicit definitional format."). Consistently using terms in a specialized manner throughout the specification is one method for defining terms by implication.

See Bell Atl., 262 F.3d at 1273 (holding that the consistent use of the non-technical term "mode" in the specification implicitly defined it more narrowly than the broader ordinary meaning). In short, "[t]he construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction." Phillips, 415 F.3d at 1316 (quoting Renishaw PLC v. Marposs Societa' per Azioni, 158 F.3d 1243, 1250 (Fed. Cir. 1998)).

b. Infringement

It is well established that "[a] patentee claiming infringement must present proof that the accused product[s] meet[] each and every claim limitation." Forest Labs., Inc. v. Abbott Labs., 239 F.3d 1305, 1310 (Fed. Cir. 2001). The patentee must also prove that the accused infringer either directly infringed the patent under 35 U.S.C. § 271(a), by "mak[ing], us[ing], offer[ing] to sell, . . . sell[ing], . . . or import[ing]" the patented invention, or indirectly infringed the patent under 35 U.S.C. § 271(b) or § 271(c), by "actively induc[ing]" infringement or by contributing to infringement. Failure to provide the evidence necessary to establish a genuine issue of material fact on these points warrants summary judgment of no infringement. Cf. Celotex, 477 U.S. at 325.[7]

[7] Amdocs has not clearly articulated its theory of infringement in its pleadings. Because Amdocs has presented no evidence of a

Because infringement is a question of fact, the Court must view the facts and reasonable inferences in the light most favorable to the nonmoving party; summary judgment is appropriate "only if no reasonable jury could return a verdict for the nonmoving party." Bell Atl., 262 F.3d at 1267 (quoting Anderson, 477 U.S. at 255) (internal quotation marks omitted).

2. The '065, '510, and '984 patents

Careful scrutiny of the claims and specifications of the '065, '510, and '984 patents reveals that inherent in the invention is a distributed architecture. In this context, "distributed" means that network usage records are processed close to their sources before being transmitted to a centralized manager. This architecture can be analogized to a hub and spoke structure, in which the processing at the spokes reduces the amount of information that must be sent to the hub, thereby decreasing the necessary bandwidth and increasing the efficiency of the system.[8]

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third party infringer as required for indirect theories of infringement, it is limited to direct infringement. Moreover, because Amdocs agrees that it must prove that the accused products meet each and every claim limitation, Pl.'s Opp'n at 18, it is limited to literal infringement. Accordingly, the Court has considered only a direct and literal infringement theory for purposes of deciding Openet's motion for summary judgment of no infringement.

[8] In other contexts, the term "distributed" has a broader technical meaning. For example, the verb "distribute" can be defined as "[t]o allocate among locations or facilities, as in a

The evidence that Amdocs argues creates a genuine issue of material fact regarding infringement is very sparse, and primarily consists of proposals made by Openet to telecommunications companies operating outside of the United States. Moreover, that evidence indicates that Openet's accused products do not have the distributed architecture required by the '065, '510, and '984 patents, but instead function as a pipeline, in which all of the output from one phase of processing is passed to another phase of processing until the final results are transmitted to the network service provider's billing and invoicing system. Accordingly, there is no evidence that Openet's products infringe the '065, '510, or '984 patents.

a. The Claimed System

The purpose of the system claimed by the '065, '510, and '984 patents is to "give[] Network Service Providers (NSPs), including Internet Services Providers (ISPs) and enterprise network(Intranet) [sic] operators, the information needed to set the right-price for IP (Internet Protocol) services." Defs.' Ex. D ('065 patent) at 3:28-31; Defs.' Ex. C ('510 patent) at

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data-processing function that is performed by a collection of computers and other devices linked together by a network." Microsoft Computer Dictionary 167 (5th ed. 2002). Alternatively, "distributed processing" can be defined as "[a] form of information processing in which work is performed by separate computers linked through a communications network." Id. at 168. The "distributed" architecture described in the patents-in-suit is therefore a specific instantiation of a broader computing principle.

3:31-34; Defs.' Ex. B ('984 patent) at 2:67-3:3. Specifically, "[t]he system provides a clear picture of user-level network service use," and thereby "enable[s] NSPs to deploy new services based on documented usage trends, plan network resource provisioning, and audit service usage," as well as enabling NSPs to "generate accurate usage-based billing and implement usage-based charge-back models" based on their customers' use of their networks. Defs.' Ex. D ('065 patent) at 3:49-55, 3:31-39; Defs.' Ex. C ('510 patent) at 3:52-59, 3:34-42; Defs.' Ex. B ('984 patent) at 3:21-27, 3:3-11. Because the system is designed to run on NSPs' networks, see Defs.' Ex. D ('065 patent) at 3:33-42; Defs.' Ex. C ('510 patent) at 3:36-45; Defs.' Ex. B ('984 patent) at 3:5-14, it is important that the system operate efficiently and "minimize[] network impact," Defs.' Ex. D ('065 patent) at 3:61; Defs.' Ex. C ('510 patent) at 3:64; Defs.' Ex. B ('984 patent) at 3:33; see also Defs.' Ex. D ('065 patent) at 3:58-60 ("Data collection and management is designed for efficiency to minimize impact on the network and system resources."); accord Defs.' Ex. C ('510 patent) at 3:62-63; Defs.' Ex. B ('984 patent) at 3:30-32. The system accomplishes this minimization through its distributed "hub and spoke" architecture.

At the hub of the system is the Central Event Manager (CEM), which "acts as the central nervous system of the system."

Defs.' Ex. D ('065 patent) at 8:13-14; Defs.' Ex. C ('510 patent) at 8:11-12; Defs.' Ex. B ('984 patent) at 7:52-53. The CEM configures the rest of the system based on the NSP's preferred "collection scheme," which defines the information that must be collected as well as the "set of operations the system must perform to obtain the desired information." Defs.' Ex. D ('065 patent) at 8:27-30; Defs.' Ex. C ('510 patent) at 8:24-27; Defs.' Ex. B ('984 patent) at 7:66-8:2. Thus, all of the operations performed by the rest of the system are determined by the collection scheme and controlled by the CEM. See Defs.' Ex. D ('065 patent) at 8:30-33; Defs.' Ex. C ('510 patent) at 8:27-30; Defs.' Ex. B ('984 patent) at 8:2-5.

The CEM can optionally be connected to a centralized database or other form of data repository; this repository stores the system's configuration information and may also include a table for storing the network accounting data collected by the rest of the system. Defs.' Ex. D ('065 patent) at 8:33-35, 9:2-11; Defs.' Ex. C ('510 patent) at 8:30-32, 8:65-9:7; Defs.' Ex. B ('984 patent) at 8:5-7, 8:41-50. The table for storing the collected network accounting data is made up of "pre-defined fields that are configured by the CEM on installation." Defs.' Ex. D ('065 patent) at 9:15-16; Defs.' Ex. C ('510 patent) at 9:11-12; Defs.' Ex. B ('984 patent) at 8:54-56. Each of these fields "represents a network session

parameter" and each record stored in the table "describes a network session." Defs.' Ex. D ('065 patent) at 9:13-15; Defs.' Ex. C ('510 patent) at 9:9-11; Defs.' Ex. B ('984 patent) at 8:52-54. Thus, by defining "what data will be stored in each field in the central database and how that data is collected," the NSP can define precisely which network usage information the rest of the system must collect. Defs.' Ex. D ('065 patent) at 9:8-11; Defs.' Ex. C ('510 patent) at 9:4-7; Defs.' Ex. B ('984 patent) at 8:48-50.

If the CEM is the hub of the system, then so-called "network devices" or, more generically, "network information sources" are its outermost spokes. Network devices are the means by which NSPs provide their customers with services, which may include e-mail, voice over Internet Protocol, or streaming audio and video. Defs.' Ex. D ('065 patent) at 1:42-45; Defs.' Ex. C ('510 patent) at 1:46-49; Defs.' Ex. B ('984 patent) at 1:37-40. Examples of network devices include a firewall, an LDAP server, a DNS server, a proxy server, a RADIUS router, and a Cisco Netflow router. See '065 patent fig. 1; '510 patent fig. 1; '984 patent fig. 1. Network devices typically also "keep logging and statistical information about their activity." Defs.' Ex. D ('065 patent) at 5:18-20; Defs.' Ex. C ('510 patent) at 5:20-22; Defs.' Ex. B ('984 patent) at 4:58-59.

Because network devices generally keep such information, they are "representative of the types of sources of information that could be accessed." Defs.' Ex. D ('065 patent) at 5:15-16; Defs.' Ex. C ('510 patent) at 5:17-18; Defs.' Ex. B ('984 patent) at 4:54-55. Although the patents-in-suit do not require network devices specifically, the system must be able to access some form of "network information source" that provides information about customers' use of the network for which the NSP wants to account and bill. See Defs.' Ex. D ('065 patent) at 5:13-14, 21-26; Defs.' Ex. C ('510 patent) at 5:15-16; Defs.' Ex. B ('984 patent) at 4:52-53. Examples of such information sources include "the log file of a mail server, the logging facility of a firewall, a traffic statistics table available on a router and accessible through SNMP [Simple Network Management Protocol], a database entry accessible through the Internet, [and] an authentication server's query interface." Defs.' Ex. D ('065 patent) at 5:20-24; Defs.' Ex. C ('510 patent) at 5:22-26; '984 patent 4:59-64.

The methods for obtaining network usage information from such network information sources are highly variable, however, and often turn on the specific make and model of the network devices. See Defs.' Ex. D ('065 patent) at 5:27-30 ("Each type of network device can be accessing [sic] using a different method or protocols."); accord Defs.' Ex. C ('510 patent) at

5:29-32; Defs.' Ex. B ('984 patent) at 4:66-5:2. The system therefore includes Information Source Modules (ISMs), which act as translators between network information sources and the rest of the system. See Defs.' Ex. D ('065 patent) at 5:33-35 ("The information source modules act as interfaces or 'translators,' sending IP usage data, in real time, from the network devices to the gatherers."); accord Defs.' Ex. C ('510 patent) at 5:38-40; Defs.' Ex. B ('984 patent) at 5:7-9. Each ISM is "designed for a specific type of network data source," Defs.' Ex. D ('065 patent) at 5:39-40; Defs.' Ex. C ('510 patent) at 5:40-41; Defs.' Ex. B ('984 patent) at 5:9-10, meaning that each ISM is programmed to use the appropriate method to access the network information generated by a particular network information source, to retrieve that network information, and to translate the retrieved data into a generalized, "platform-neutral" format. See Defs.' Ex. D ('065 patent) at 5:33-40; Defs.' Ex. C ('510 patent) at 5:34-41; Defs.' Ex. B ('984 patent) at 5:4-11.

ISMs exist in one of three forms: asynchronous, synchronous, or pipe. Defs.' Ex. D ('065 patent) at 6:9; Defs.' Ex. C ('510 patent) at 6:11; Defs.' Ex. B ('984 patent) at 5:48. Asynchronous ISMs are triggered when the associated network device stores information about its usage; they "react[] to the information . . . without prompting from other information sources in the system." Defs.' Ex. D ('065 patent) at 6:10-13;

Defs.' Ex. C ('510 patent) at 6:12-15; Defs.' Ex. B ('984 patent) at 5:49-52. Synchronous ISMs are triggered only when another part of the system requests information from them.[9] Defs.' Ex. D ('065 patent) at 6:19-26; Defs.' Ex. C ('510 patent) at 6:21-28; Defs.' Ex. B ('984 patent) at 5:58-65. Finally, pipe ISMs process "record flows (batches of records)" when they arrive from the network information source; this processing can include filtering or aggregating the records, sending alarms based on the records, initiating new batches of records, or "provision[ing] network elements to provide or stop services." Defs.' Ex. D ('065 patent) at 6:26-41; Defs.' Ex. C ('510 patent) at 6:29-43; Defs.' Ex. B ('984 patent) at 5:66-6:13.

After the ISMs have performed the translation, a "gatherer" collects the platform-neutral records from one or more ISMs. Defs.' Ex. D ('065 patent) at 6:54, 6:65-66; Defs.' Ex. C ('510

[9] An example of a synchronous ISM is one associated with a Domain Name System (DNS) server. Defs.' Ex. D ('065 patent) at 6:20-21; Defs.' Ex. C ('510 patent) at 6:22-23; Defs.' Ex. B ('984 patent) at 5:59-60. DNS servers "maintain[] information matching the IP addresses of host computers to their domain addresses." Defs.' Ex. D ('065 patent) at 6:21-23; Defs.' Ex. C ('510 patent) at 6:23-25; Defs.' Ex. B ('984 patent) at 5:60-62. An ISM attached to a DNS server will remain dormant until another part of the system sends to it a request for the domain address of a particular IP address; upon receiving that request, the ISM will query the DNS server using the appropriate method for retrieving network information, and will relay the retrieved information back to the requestor. Defs.' Ex. D ('065 patent) at 6:23-26; Defs.' Ex. C ('510 patent) at 6:25-28; Defs.' Ex. B ('984 patent) at 5:62-65.

patent) at 6:55, 6:66-67; Defs.' Ex. B ('984 patent) at 6:25, 6:36-37. Gatherers' primary functions are to perform "flexible, policy-based data aggregation" and to "extract[] the fields needed by the CEM and fill[] in any fields that may be missing." Defs.' Ex. D ('065 patent) at 7:3-7; Defs.' Ex. C ('510 patent) at 7:4-8; Defs.' Ex. B ('984 patent) at 6:41-46. Because "[t]ypically, data collected from a single source does not contain all the information needed for billing and accounting," the gatherers "enhance" that data by "combining IP session data from multiple sources." Defs.' Ex. D ('065 patent) at 7:51-57; Defs.' Ex. C ('510 patent) at 7:51-57; Defs.' Ex. B ('984 patent) at 7:24-30. For example, a data record describing a particular network usage session can be "enhanced" with the user name and the name of the user's organization.

The specification labels this function of the gatherers "data enhancement." See Defs.' Ex. D ('065 patent) at 10:46-48; Defs.' Ex. C ('510 patent) at 10:45-11:1; Defs.' Ex. B ('984 patent) at 10:14-16. Data enhancement "comprises a number of field enhancements." Defs.' Ex. D ('065 patent) at 11:1-2; Defs.' Ex. C ('510 patent) at 11:4-5; Defs.' Ex. B ('984 patent) at 10:19-20. A field enhancement "specifies how the data obtained from the trigger of the enhancement procedure is processed before it is placed in a single field in the central database." Defs.' Ex. D ('065 patent) at 11:2-4; Defs.' Ex. C

('510 patent) at 11:5-8; Defs.' Ex. B ('984 patent) at 10:20-23. That is, each field of desired network usage information is configured by the CEM to have an associated "field enhancement." Defs.' Ex. D ('065 patent) at 7:63-8:2, 11:26-29; Defs.' Ex. C ('510 patent) at 7:63-8:2; 11:29-32; Defs.' Ex. B ('984 patent) at 7:37-43; 10:57-60; see also Defs.' Ex. D ('065 patent) at 12:45-49 ("The NSP defines field enhancements for each field in which NSP wants to collect data from the trigger. If no field enhancements are defined, no data from the trigger will be collected in the fields."); accord Defs.' Ex. C ('510 patent) at 12:47-51; Defs.' Ex. B ('984 patent) at 12:6-9. The DR ("detail record") is the receptacle into which all of the enhanced fields are written. Defs.' Ex. D ('065 patent) at 11:12-14; Defs.' Ex. C ('510 patent) at 11:15-17; Defs.' Ex. B ('984 patent) at 10:43-45.

One possible "field enhancement," called a "One-step Field Enhancement," involves directly placing the gathered datum into the appropriate DR field; for example, when a gatherer populates a DR field with information that it received from its associated asynchronous ISM. See Defs.' Ex. D ('065 patent) at 11:35-38; Defs.' Ex. C ('510 patent) at 11:38-41; Defs.' Ex. B ('984 patent) at 10:66-11:2. In a "Two-step Field Enhancement," the gatherer "appl[ies] a Synchronous ISM function" to a network usage datum retrieved from the associated asynchronous ISM and

places the result of that function into the appropriate DR field. See Defs.' Ex. D ('065 patent) at 11:40-44; Defs.' Ex. C ('510 patent) at 11:43-47; Defs.' Ex. B ('984 patent) at 11:3-7. There is no limit to the number of steps or functions that can be applied in a field enhancement. Defs.' Ex. D ('065 patent) at 11:10-11; Defs.' Ex. C ('510 patent) at 11:13-14; Defs.' Ex. B ('984 patent) at 10:41-42.

At any point during a data enhancement, the gatherers may also "aggregate" or "filter" the records.[10] Defs.' Ex. D ('065 patent) at 7:21-24; Defs.' Ex. C ('510 patent) at 7:22-25; Defs.' Ex. B ('984 patent) at 6:60-63. Aggregation entails "accumulating groups of data record flows, [and] generating a single record for each group," which "includes the aggregated information." Defs.' Ex. D ('065 patent) at 7:13-15; Defs.' Ex. C ('510 patent) at 7:14-16; Defs.' Ex. B ('984 patent) at 6:51-53. Filtering is defined as discarding data records that "are known to be collected elsewhere." Defs.' Ex. D ('065 patent) at 7:17-19; Defs.' Ex. C ('510 patent) at 7:18-20; Defs.' Ex. B ('984 patent) at 6:55-57. A situation that requires filtering occurs when a single session of network use by a customer generates network records in two distinct network information

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[10] As noted above, some ISMs can also perform the aggregation and filtering functions. See Defs.' Ex. D ('065 patent) at 6:35; Defs.' Ex. C ('510 patent) at 6:37; Defs.' Ex. B ('984 patent) at 6:7-8.

sources; for example, if a single web browsing session causes both the router and the firewall to generate logs of that activity. The system allows the NSP to configure which data records to collect and which to discard when multiple network information sources generate the same network usage data. Defs.' Ex. D ('065 patent) at 7:19-20; Defs.' Ex. C ('510 patent) at 7:20-21; Defs.' Ex. B ('984 patent) at 6:57-59.

The gatherers then transmit the aggregated, filtered, and enhanced DRs to the CEM. Defs.' Ex. D ('065 patent) at 8:33-35; Defs.' Ex. C ('510 patent) at 8:30-32; Defs.' Ex. B ('984 patent) at 8:5-6. The CEM can be configured to "merge duplicate records before storing them in the central database." Defs.' Ex. D ('065 patent) at 8:35-37; Defs.' Ex. C ('510 patent) at 8:32-34; Defs.' Ex. B ('984 patent) at 8:7-9. According to the specification, "[a] merge is achieved by matching some of the fields in a data record and then merging the matching records from at least two record flows, transforming them into one record before updating the central database." Defs.' Ex. D ('065 patent) at 9:34-38; Defs.' Ex. C ('510 patent) at 9:30-34; Defs.' Ex. B ('984 patent) at 9:8-11. This process is desirable because "each IP session may generate multiple transaction records," and removing duplicates will "enhanc[e] the efficiency of the data repository." Defs.' Ex. D ('065 patent) at 9:25-27; Defs.' Ex. C ('510 patent) at 9:21-24; Defs.' Ex. B ('984

patent) at 8:65-9:1. After any configured merging is finished, the enhanced and merged records are either stored in the optional data repository or sent directly to an external application, for example, the NSP's billing system. See Defs.' Ex. D ('065 patent) at 10:38-40; Defs.' Ex. C ('510 patent) at 10:36-38; Defs.' Ex. B ('984 patent) at 10:6-8.

In summary, the patented system includes a Centralized Event Manager (CEM) that defines the fields to be populated, prescribes for each field the functions that must be applied to populate it, and configures the rest of the system to execute that processing. The system is designed to execute specific pieces of this processing at specific stages. First, the Information Source Modules (ISMs) gather network information from their associated network information sources. The ISMs pass that network information to the gatherers, which generate detail records (DRs) by "perform[ing] data enhancement to complete the data from the ISMs." Defs.' Ex. D ('065 patent) at 10:34-36; Defs.' Ex. C ('510 patent) at 10:32-34; Defs.' Ex. B ('984 patent) at 10:2-4. Filtering and aggregation may occur either at the ISM or at the gatherer stage. The DRs are passed to the CEM, which may remove redundant data through data merges. Finally, the results of the merge are stored in a central data repository or are sent to an external system. See Defs.' Ex. D ('065 patent) at 10:26-44 ("Data Distillation"); accord Defs.'

Ex. C ('510 patent) at 10:25-43; Defs.' Ex. B ('984 patent) at 9:62-10:12.

The specific description of what processing occurs at each stage is important for distinguishing the invention from earlier systems. In earlier systems, "all the network information flows to one location, making it very difficult to keep up with the massive record flows from the network devices and requiring huge databases." Defs.' Ex. B ('984 patent) at 4:9-13; Defs.' Ex. C ('510 patent) at 4:41-44; Defs.' Ex. D ('065 patent) at 4:39-42. These previous systems stored all network usage information "in a database and then database operations [were] performed in order to create bills or reports." Defs.' Ex. B ('984 patent) at 7:17-19; Defs.' Ex. C ('510 patent) at 7:44-47; Defs.' Ex. D ('065 patent) at 7:45-47. These systems thus processed all of the network usage information at a single, central location.

In contrast, the patented system "minimizes network impact by collecting and processing data close to its source." Defs.' Ex. B ('984 patent) at 3:33-34; Defs.' Ex. C ('510 patent) at 3:64-65; Defs.' Ex. D ('065 patent) at 3:62-63. Specifically, collecting and processing data close to its source "reduc[es] the volume of data sent on the network to the CEM," thereby "eliminat[ing] capacity bottlenecks [and] improving the scalability and efficiency of the system." Defs.' Ex. D ('065 patent) at 7:9-12; Defs.' Ex. C ('510 patent) at 7:9-12; Defs.'

Ex. B ('984 patent) at 6:47-50. The system thus functions efficiently because aggregation, filtering, and enhancement are performed by the gatherers rather than by the CEM. This design gives the system its "distributed architecture," Defs.' Ex. D ('065 patent) at 15:66; Defs.' Ex. C ('510 patent) at 15:66; Defs.' Ex. B ('984 patent) at 15:26, because the processing is not consolidated in a "hub," the CEM or the central database, but is instead distributed across "spokes," the several gatherers in the network.

The distributed architecture and associated efficiency gains are inherent properties of the patented system itself and are not limited to some embodiments of the system. The specifications of the '065, '510, and '984 patents carefully differentiate between "the system" they describe and "some embodiments" of that system. See, e.g., Defs.' Ex. D ('065 patent) at 15:60-64 ("A network accounting and billing system and method has been described. In some embodiments, the system can access any network related information sources such as traffic statistics provided by routers and switching hubs as well as application server access logs." (emphases added)); accord Defs.' Ex. C ('510 patent) at 15:60-64; Defs.' Ex. B ('984 patent) at 5:20-24. The improved efficiency is expressly described as a property of the system. See Defs.' Ex. D ('065 patent) at 15:66-16:2 ("Because of the distributed architecture,

filtering and enhancements, the system efficiently and accurately collects the network usage information for storage in a form that is useful for billing and accounting."); accord Defs.' Ex. C ('510 patent) at 15:66-16:2; Defs.' Ex. B ('984 patent) at 15:26-29. Notably, the provided examples of "additional embodiments" retain the distributed architecture described in the primary system description. See, e.g., Defs.' Ex. D ('065 patent) at 15:34-36 ("In other embodiments, the general ideas described herein can be applied to other distributed data enhancement problems."); Defs.' Ex. C ('510 patent) at 15:34-36; Defs.' Ex. B ('984 patent) at 14:61-63. Particularly because it is the feature that distinguishes the patented system from preexisting technology, the distributed processing of network records is a key component of the '065, '510, and '984 patents.

b. Construction of "enhance" and "enhancement" ('065 patent)

The construction of "enhance" in the asserted independent claims of the '065 patent is problematic. The parties agree that the term has no ordinary and customary technical meaning. Using the term's ordinary English meaning, however, renders the asserted claims extremely broad and amorphous, and untethers them from the invention described in the specification. If the claim language is to have any particularized meaning, therefore,

it must be found in the specification, which describes the processes of "data enhancement" and "field enhancement" in great detail. Recognizing that defining a term through reference to itself is not ideal, the Court nonetheless concludes that the best construction of the term "enhance" in the asserted independent claims of the '065 patent is "to apply a number of field enhancements in a distributed fashion," and that a field enhancement is "the application of zero or more functions to a piece of network usage information."

The starting point for claim construction is the specific language of the claim to be construed. See Ecolab, 285 F.3d at 1374. Each of the three asserted independent claims of the '065 patent uses the term "enhance" or "enhancement."[11] Claim 7 is illustrative and provides as follows:

> 7. A method of processing network accounting information comprising:
> receiving from a first source a first network accounting record;
> correlating the first network accounting record with accounting information available from a second source; and

[11] Claim 7 of the '797 patent also uses the term "enhancement procedure." See Defs.' Ex. A ('797 patent) at 17:4-5. That term is used in only one of the three asserted independent '797 patent claims, however, whereas all three of the asserted independent '065 patent claims use the term "enhance" or a variation thereof. Because the term "enhance" is a primary focus of the asserted '065 patent claims but not of the asserted '797 patent claims, the construction of the term centers on the '065 patent.

> using the accounting information with which the first network accounting record is correlated to **enhance** the first network accounting record.

Defs.' Ex. D ('065 patent) at 16:37-46 (emphasis added).[12] Openet argues that the term "enhance" is indefinite and does not have an ordinary and customary meaning to one skilled in the art. Defs.' Mot. for Summ. J. at 15. Amdocs responds that the term is "clear in everyday English" and in this context means "[t]o add information to or modify information in a record." Amdocs' Opp'n to Openet's Proposed Claim Constructions and Mot. for Summ. J. of Non-Infringement and Invalidity ("Pl.'s Opp'n") at 11.

In "everyday English," to "enhance" means "[t]o increase or make greater, as in value, beauty, or reputation: augment." Webster's II: New Riverside University Dictionary (1984) 433; accord The American Heritage Collection Dictionary (3d ed. 2000) 456. If this definition applied, claim 7 quoted above would claim a method for taking network accounting records from two sources, correlating them, and then augmenting the first record

[12] Claim 1 is much the same except it describes a computer program product embodied in a computer readable storage medium for processing network accounting information, and each step is not part of a method, but the computer code for performing that step. Defs.' Ex. D ('065 patent) at 16:4-14. Claim 13 is similar except it describes a system and instead of using "enhance" as a verb, it describes a part of the system as "an enhancement component that augments data in one of the records produced by one of the plurality of data collectors with data from a different one of the records produced by another of the plurality of data collectors." Id. at 17:3-6.

with information from the second, thereby "enhancing" it. Such a method is so broad that it encompasses almost any conceivable operation on network accounting records.

When the "ordinary meaning of [a] non-technical term" is "sufficiently broad and amorphous," reference to the written description can define the scope of the claim language. See Bell Atl., 262 F.3d at 1269-70. Accordingly, the next step is to examine the specification. Openet argues that if "enhance" is not indefinite, its construction should be limited to the "field enhancement procedures described in the '797 patent, where the user selects specific functions to be applied to specific fields of a record." Defs.' Mot. for Summ. J. at 15. Openet's proposed construction misses the purpose of field enhancements by focusing on the Graphical User Interface (GUI) described in claim 7 of the '797 patent, which includes the limitation that:

> [T]he data is collected utilizing an enhancement procedure defined utilizing a graphic user interface by: listing a plurality of available functions to be applied in real-time prior to end-user reporting, allowing a user to choose at least one of a plurality of fields, and allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.

Defs.' Ex. A ('797 patent) at 17:4-12. But no reference is made in the asserted '065 patent claims to a GUI, despite use of the term "enhance" in all of the asserted independent claims.

Moreover, the term "enhance" does not appear in two of the three asserted independent '797 patent claims. Looking primarily to the '797 claims to construe the term "enhance" in the '065 patent is therefore inappropriate.

In the asserted '065 patent claims, independent claims 1 and 7 both use "enhance" as a verb, while independent claim 13 describes an "enhancement component," essentially using the term as an adjective. Although none of the three independent claims use "enhancement" as a noun, most uses of the term "enhancement" in the specification are as a noun in two well-defined contexts: "data enhancement" and "field enhancement." See, e.g., Defs.' Ex. D ('065 patent) at 10:5 ("D. Data Enhancement"); id. at 11:2-49 (discussing the many forms of "field enhancements").

Importantly, "enhance" is used as a verb in the section of the specification that describes gatherers, in which the specification provides:

> Typically, data collected from a single source does not contain all the information needed for billing and accounting, such as user name and organization. In such cases, the data is enhanced.

Defs.' Ex. D ('065 patent) at 7:51-54; accord Defs.' Ex. C ('510 patent) at 7:51-54; Defs.' Ex. B ('984 patent) at 7:24-27; Defs.' Ex. A ('797 patent) at 9:41-44.[13] The specification's use

[13] "Enhance" is also used as a verb in the section describing the "Central Database." Two of those usages clearly intend the term's ordinary meaning, as they discuss "enhancing the

of the verb "enhance" to describe an action applied to "data" strongly supports a claim construction that construes "enhance" to mean "data enhancement," not "field enhancement."

As the '065 patent makes clear, data enhancement is a procedure applied to records, whereas field enhancement is a procedure applied to fields within those records. See Defs.' Ex. D ('065 patent) at 11:1-14. Similarly, in the text of the disputed claims, the verb "enhance" is applied to network accounting records, not to fields within them. See, e.g., Defs.' Ex. D ('065 patent), cl. 1, at 16:12-14 ("[U]sing the accounting information with which the first network accounting record is correlated to enhance the first network accounting record."). Accordingly, the Court concludes that the terms "enhance" and "enhancement" as used in the asserted independent

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efficiency of the data repository." Defs.' Ex. D ('065 patent) at 9:26-28 ("[D]uring the merge process the CEM identifies and discards duplications, enhancing the efficiency of the data repository."); id. at 9:33-34 ("The database tables that contain the record flows can be indexed, enhancing the efficiency of the data repository."). The remaining use of "enhance" as a verb is:

> Generally, data records are passed through the merger program, in the CEM, into the central database. However, the data records are also cached so that if matching records appear at some point, the already stored records can be replaced or enhanced with the new records.

Defs.' Ex. D ('065 patent) at 9:28-32. In this context, it is apparent that "enhance" is being used imprecisely as short-hand for the "merging" process, and is therefore not relevant to the construction of "enhance" in the '065 claims.

'065 patent claims refer to "data enhancement" as defined in the specification.

The specification provides that "[d]ata enhancement comprises a number of field enhancements." Id. at 11:1-2. This definition is unsurprising because data enhancement operates on records, which are essentially sets of fields. See id. at 11:11-14 ("The data record starts with fields obtained from an asynchronous ISM. The fields in the DR are then enhanced using the field enhancements. The enhanced fields result in the DR."). The specification goes on to define "field enhancement" both explicitly and through examples, giving the following description:

> A field enhancement specifies how the data obtained from the trigger of the enhancement procedure is processed before it is placed in a single field in the central database. The data can be placed in the field directly, or new information may be added to the record by applying a Synchronous ISM function. . . . Field enhancements may involve one or multiple steps. There is no limit to the number of steps in a Field Enhancement.

Id. at 11:2-11; see also id. at 11:31-12:6 (providing examples).

Amdocs cites two sections of the '065 patent specification[14] and argues that they provide two examples of "enhancement other than field enhancement." Pl.'s Opp'n at 11. Amdocs is correct

[14] Amdocs also cites two sections of the '797 patent specification. These sections of the '797 patent are identical to the cited sections of the '065 patent. Compare Defs.' Ex. D ('065 patent) at 11:50-67, 12:1-6; with Defs.' Ex. A ('797 patent) at 13:24-41, 13:42-47.

insofar as these citations are expressly defined to be examples of "data enhancement," not field enhancement. Properly understood, however, they establish that data enhancement is the application of a number of field enhancements.

The first section, from the '065 patent, provides:

> The following illustrates an example [sic] data enhancement. Suppose the data obtained from a proxy server contains the source IP address of a given session, such as 199.203.132.2, but not the complete domain address of the host computer (its Fully Qualified Domain Name), such as www.xacct.com. The name of the host can be obtained by another network device -- the Domain Name System (DNS) server. The DNS-server contains information that matches IP addresses of host computers to their Fully Qualified Domain Names (FQDNs). Through an enhancement procedure the information collected from the proxy server can be supplemented by the information from the DNS. Therefore, the name of the host is added to the data (the data record) collected from the proxy server. The process of adding new data to the data record from different network devices can be repeated several times until all required data is collected and the data record is placed in the central database.

Defs.' Ex. D ('065 patent) at 11:50-67. This example illustrates the application of a data enhancement to a network record obtained from a proxy server. The illustration assumes that the proxy server logs "contain[] the source IP address of a given session, such as 199.203.132.2, but not the complete domain address of the host computer . . ., such as www.xacct.com." Id. at 11:51-55. Presumably, the complete domain address is a piece of "required data" as defined by the NSP. See id. at 11:62-66 (observing that the host name can be

added to the data record and the process can be repeated until "all required data is collected"). The illustration further explains that another network device, the Domain Name Server (DNS), contains the mapping between IP addresses and domain names.[15] Id. at 11:55-58. After observing that an enhancement procedure allows the system to retrieve the host name from the DNS, the illustration concludes by explaining that the new datum, the host name, can thereafter be added to the original data record collected from the proxy server; this process can be repeated as often as necessary for as many fields as required by the NSP. See id. at 11:59-67. Thus, despite Amdocs' contention to the contrary, this illustration demonstrates the application of a field enhancement, as defined by the specification, as one portion of the application of a data enhancement.

The second section describes figure 4B of the patent, and is another illustration of a data enhancement:

> FIG. 4B illustrates another example [sic] data enhancement where an enhanced record **490** is created from an initial netflow record **492**. Fields in the enhanced record **490** are enhanced from the radius record **494**, the QoS policy server record **496**, the NMS DB record **498**, and the LDAP record **499**.

Defs.' Ex. D ('065 patent) at 12:1-6.

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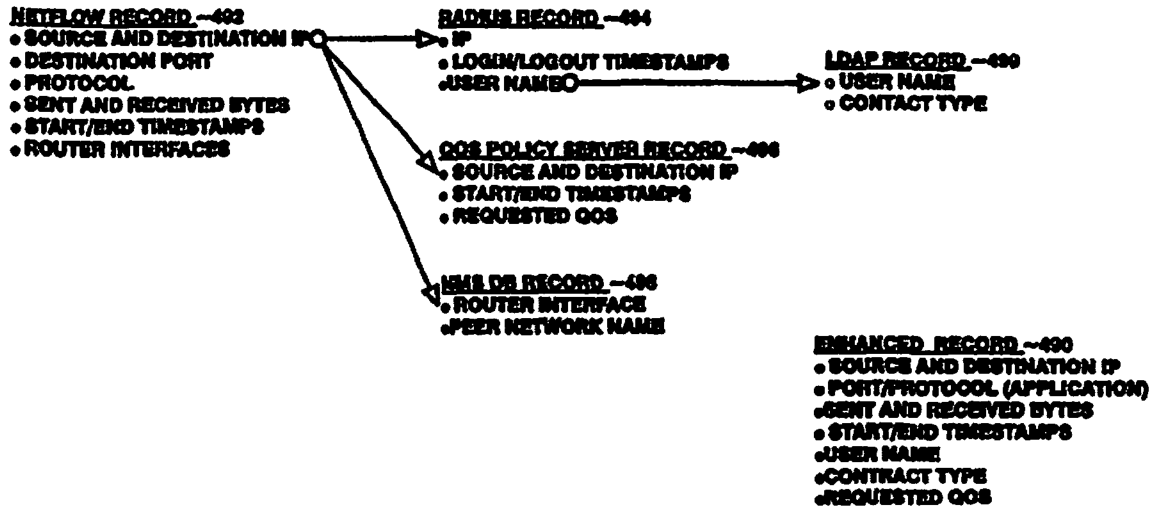
[15] Recall that the ISM attached to the DNS is a Synchronous ISM, see id. at 6:20-21, and that the specification's description of "field enhancement," quoted above, explicitly contemplated adding new information to a data record by "applying a Synchronous ISM function," id. at 11:6-7.



'065 patent fig. 4B. In this figure, the arrows show correlations between network records that have been collected from various network devices. This example describes the process for using these correlations to create an "enhanced record" from "an initial netflow record," and like the first example cited by Amdocs it demonstrates that a data enhancement is the application of a number of field enhancements. Id. at 12:2-3. Specifically, it shows that the Source and Destination IP field from the initial netflow network record (492)[16] can be correlated to the IP fields in network records collected by gatherers attached to other network devices, specifically RADIUS (494), QoS policy server (496), and NMS DB (498) devices. This correlation enables the system to create an "enhanced record"

[16] The numbers in parentheses refer to the associated diagram in figure 4B.

(490) that includes not only the Source and Destination IP field, as well as other fields from the initial netflow record, but also the user name and requested QoS fields. See id. at 12:3-6 & fig. 4B. The direct placement of the Source and Destination IP field into the enhanced record is a "One-step Field Enhancement" and the placements of the user name and requested QoS into the enhanced record are each a "Two-step Field Enhancement." Cf. id. at 11:35-44.

Additionally, once the corresponding RADIUS record has been located, the user name field from the RADIUS record can be correlated to the user name field in the record collected by the gatherer attached to the LDAP server, allowing the contract type field to be added to the enhanced record. See id. at 12:3-6 & Fig. 4B. This process is an example of a "Three-step Field Enhancement." Cf. id. at 11:45-49. Thus, Amdocs' argument that its broad construction is mandated by these illustrations is without merit, as the cited sections of the specification are examples of the application of a number of field enhancements to accomplish a data enhancement.

Finally and most importantly, the specification emphasizes that enhancement occurs close to the source of the network usage information. See, e.g., Defs.' Ex. D ('065 patent) at 4:33-35 ("Importantly, the distributed data gathering, filtering and enhancements performed in the system enables load distribution."

(emphases added)); id. at 15:26-29 ("Because of the distributed architecture, filtering and enhancements, the system efficiently and accurately collects the network usage information for storage in a form that is useful for billing and accounting." (emphases added)). In fact, as discussed above, the specification explicitly distinguishes between the patented invention and earlier systems on the basis of its distributed architecture, and such distinctions are properly considered in claim construction. See, e.g., Hearing Components, Inc. v. Shure, Inc., 600 F.3d 1357, 1367 (Fed. Cir. 2010) (observing that the specification disparages certain prior art and reasoning about proper claim construction based on that disparagement). Accordingly, a proper construction of the term "enhance" must include the distributed nature of the process.

For all these reasons, the Court concludes that the proper construction of the term "enhance" as used in the asserted '065 independent claims is: "to apply a number of field enhancements in a distributed fashion." The term "field enhancement" should be construed as defined by the '065 patent specification, specifically as "the application of zero or more functions to a piece of network usage information."

c. No evidence of '065 patent infringement

Openet argues that there is no evidence that Openet has provided infringing software to any customer in the United

States. According to Openet, the allegedly infringing product, the Correlation and Transaction Engine (CTE) in the FusionWorks Framework, does not perform any functions without the addition of code written in the DataStream Decoder (DSD) language. See Defs.' Mot. for Summ. J. at 27. Openet argues that there is no evidence of such DSD code being provided to customers in the United States. In response, Amdocs argues that it can produce evidence to show that the underlying FusionWorks framework, and in particular the CTE, is capable of infringing the '065 patent, which is sufficient as a matter of law. See Pl.'s Opp'n at 27. It also claims to have "demonstrated actual infringing implementations at various of [Openet's] customers," id.; however, the evidence relied upon by Amdocs does not support its arguments. Specifically, Amdocs relies on four pieces of evidence:

- A proposal made by Openet for Videotron Itée, a Canadian company. See Pl.'s Opp'n at 25, Ex. 26.
- A proposal made by Openet for PTC Era, a Polish company. See Pl.'s Opp'n at 26, Ex. 33.
- Citations to files containing source code. See Pl.'s Opp'n at 25 n.8, 26, Exs. 29, 47-62.
- A PowerPoint presentation describing the CTE. Pl.'s Opp'n at 25, Ex. 27.

This evidence does not create a genuine issue of material fact as to infringement.

Direct infringement must occur within the United States to be actionable. See Zoltek Corp. v. United States, 672 F.3d 1309, 1332 (Fed. Cir. 2012) ("[I]nfringement can only be premised on activity within the United States . . . ."); NTP, Inc. v. Research in Motion, Ltd., 418 F.3d 1282, 1313 (Fed. Cir. 2005); see also 35 U.S.C. § 271(a). Videotron Itée and PTC Era, however, are respectively Canadian and Polish companies, and nothing in the record suggests that any products Openet may have sold to them would have operated within the United States. Cf. Deepsouth Packing Co. v. Laitram Corp., 406 U.S. 518, 527 ("[I]t is not an infringement to make or use a patented product outside of the United States. Thus, in order to secure the injunction it seeks, [patentee] must show a § 271(a) direct infringement by [accused infringer] in the United States, that is, that [accused infringer] 'makes,' 'uses,' or 'sells' the patented product within the bounds of this country." (citations omitted)). Accordingly, neither of the first two pieces of evidence upon which Amdocs relies constitute evidence of actionable infringement because they involve proposals made to foreign entities outside the United States.

The third category of evidence Amdocs provides, citations to source code without corresponding expert testimony explaining how that source code operates and relates to each claim of the patents at issue, does not give rise to a disputed issue of

material fact because all of the testimonial evidence in the record shows that the cited source code is inoperable without DSD scripts. See Hogan Decl. [Dkt. No. 97] ¶ 8; see also Defs.' Reply Brief in Support of Openet's Proposed Claim Constructions and Mot. for Summ. J. of Non-Infringement and Invalidity ("Defs.' Reply), Ex. 1 (Zegura Dep.) at 25:23-26:11. Amdocs provides a lengthy citation to DSD scripts that it claims infringe the '065 patent, but fails to provide expert testimony explaining how that code infringes each claim of the patent. See Pl.'s Opp'n at 27 & n.10. Openet has countered Amdocs' bare allegation about the DSD scripts with sworn expert testimony that those scripts do not in fact correlate or enhance records. See Wang Decl. [Dkt. No. 163] ¶¶ 4-14.

Amdocs' only remaining basis for claiming infringement of the '065 patent is an Openet PowerPoint presentation of unclear origin. Part of that presentation states that "Openet is designed to collect from multiple sources, and generate an output record . . . correlating with appropriate information from a database, to give a fully enriched IPDR output . . . ." Pl.'s Ex. 27, at OPENET00001590. Amdocs argues that this "enrichment" is equivalent to "enhancement" as used in the '065 patent; this argument fails, however, because the "enrichment" described in the presentation does not constitute "enhancement" as properly construed. Specifically, "enrichment" does not

occur close to the collection source and therefore is not "distributed," whereas the Court's construction of "enhancement" requires that it be accomplished "in a distributed fashion." The presentation shows that Openet's products do not have the requisite "hub and spoke" architecture; instead, all events are passed to the Correlation and Transaction Engine (CTE), a separate processing system. When a "trigger event specifying the start of a session is received, the CTE stores the collected data and waits for further trigger events before aggregating and correlating the data." Id. Later events related to the initial trigger event are similarly passed to the CTE and stored in the database. Id. ("All of the information collected that is relevant to a session or activity can be stored for correlation."). Based on these stored events from multiple sources, Openet can "generate an output record" that "give[s] a fully enriched . . . output." Id. This generation, however, does not occur "close to the source" of the networking account information, but in the CTE, a separate phase of processing.

Moreover, because in the Openet framework all of the events are being stored in a data repository, the generation of the "enriched record" must be completed by performing operations on that data repository. Such an architecture is explicitly disparaged in the '065 specification. See Defs.' Ex. D ('065 patent) at 4:39-42; id. at 7:43-46 (distinguishing the patented

invention from the "previous system where the information is stored in a database and then database operations are performed in order to create bills or reports."). Accordingly, the PowerPoint presentation does not create a genuine issue of material fact as to whether the CTE infringes the '065 patent.

In fact, the other evidence cited by Amdocs further supports this understanding of the Openet architecture. The proposals to the Canadian and Polish Companies similarly document that all network records are transmitted to the CTE, which stores them in a data repository, and that only after all events relating to a particular session have been stored are they correlated and combined into a single "enriched" record for the billing system. See Pl.'s Ex. 26, at OPENET01175368 ("[I]t can be seen that regardless of how the events come in from the network whether in real-time or via batch, the various related pieces are temporarily stored until all pieces of the puzzle are available for aggregating and correlating them together in real-time and producing the resultant consolidated output record."); Pl.'s Ex. 33, at OPENET00599273 ("All of the information collected relevant to a content/usage session can be stored either in Oracle or in FusionWorks high-speed internal persistent store for correlation."). Moreover, the DSD scripts that Amdocs cites would not be performed in a "distributed architecture" even if they did execute the functions that Amdocs

attributes to them. The DSD scripts allegedly "handle[] Yahoo instant messenger events," create a database table, write a set of WAP records to that table, and correlate and join events from two other database tables. See Pl.'s Opp'n at 27 n.10. Correlating rows from two database tables does not infringe the '065 patent; in fact, performing such database operations to generate records for accounting and billing was explicitly disparaged by the '065 patent's specification.

Openet is therefore entitled to summary judgment of non-infringement of the '065 patent.

d. Construction of "Completing" ('510 and '984 patents)

The term "completing" appears in each of the independent claims at issue in the '984 and '510 patents, and is used in the context of a set of limitations that combine to comprehensively describe the system explained in section II.B.2.a. Specifically, "completing" is used as follows:

> (c) [C]ompleting a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users . . . .

Defs.' Ex. B ('984 patent), cl. 1, at 15:51-54 (describing a method); see also id., cl. 13, at 16:46-50 (describing a computer program product); Defs.' Ex. C ('510 patent), cl. 16, at 17:13-17 (describing a computer program product).

Openet argues that the term "completing" is indefinite, and offers no alternative construction. Defs.' Mot. for Summ. J. at 15. In support of its argument, Openet contends that "the notion of completing a record is purely subjective, as more information can always be added to a record." Id. Amdocs counters that "completing" should be construed to mean "enhancing to generate a complete record." Pl.'s Opp'n at 12.

Openet's argument is without merit. Although in the abstract more information can always be added to a record, in the context of the patent specification, "completing" has a readily available meaning. The specifications of both the '510 and '984 patents use "complete" as a verb applied to records twice[17] and these uses imply that the purpose of applying data enhancements is to "complete" the DRs. See Defs.' Ex. B ('984 patent) at 10:3-4 ("The gatherers perform data enhancement to complete the data from the ISMs."); id. at 10:14-16 ("[T]he gatherers provide data enhancement features to complete

[17] The '984 patent also describes the CEM as having been "adapted for completing a plurality of data records from the filtered and aggregated network communications usage information." Defs.' Ex. B ('984 patent) at abstract; accord id. at 2:29-31. This description is not present in the '510 patent, a later continuation of the '984 patent. Moreover, the description of the CEM is limited to "merging" records and does not describe "completing" them. See id. at 7:51-8:39. The CEM does configure what information is required for a record to be "complete." See id. at 7:67-8:2. In the context of the overall system, the CEM's "adaption" should be understood as referring to this configuration function.

information received from the ISMs."); accord Defs.' Ex. C ('510 patent) at 10:32-34, 10:45-11:1. The system allows the NSP to define what information about its customers' network usage will be stored in the data repository by defining the fields in which that information will be stored in the data repository. See id. at 8:47-50 ("[I]n configuring the system, the NSP defines what data will be stored in each field in the central database and how that data is collected from the ISMs."); id. at 8:54-57 ("The system has a set of pre-defined fields that are configured by the CEM on installation. The NSP can modify the central database structure by adding, deleting, or modifying fields."). Because data enhancement "comprises a number of field enhancements," each of which "specifies how the data obtained from the trigger of the enhancement procedure is processed before it is placed in a single field in the central database," id. at 10:19-23, a data enhancement "completes" a record when it applies all of the field enhancements necessary to fully populate each of the fields defined in the central repository and required by the NSP. This understanding is reinforced by the '984 and '510 patents, which unlike the '065 patent explicitly limit the system to one in which the completed DRs are stored in a database. See id. at 15:55, 16:51-52; Defs.' Ex. C ('510 patent) at 17:17-18.

For the reasons given above, the Court finds that to "complete" a record means to "enhance a record until all required fields have been populated." Openet argues that "defining completion in terms of enhancement violates the doctrine of claim differentiation, as enhancement appears in the claims of the related '065 and '797 patents." Defs.' Mot. for Summ. J. at 16. The doctrine of claim differentiation provides no obstacle to defining "complete" in terms of enhancement because there is a clear distinction between the two terms; enhancing a record will not necessarily complete a record. As used in the patents, to "enhance" a record means to "apply a number of field enhancements in a distributed fashion." Only when this process is repeated as necessary until all of the required fields have been populated has the record been "completed."

e. <u>No evidence of infringement of the '510 and '984 patents</u>

The parties vigorously contest whether Openet infringes the '510 and '984 patents by collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers or by generating reports on the collection of network usage information from the network devices. <u>See</u> Defs.' Mot. for Summ. J. at 25-27; Pl.'s Opp'n at 22-24. These arguments need not be addressed, however, because as used in the

'984 and '510 patents, a record is "completed" when it has been "enhanced until all required fields have been populated." Completion thus requires enhancement; that is, if the accused products do not "enhance" network records, they cannot "complete" network records.

In section II.B.2.c., the Court concluded that Amdocs has presented insufficient evidence that the Openet products "enhance" network records. Accordingly, those products also cannot "complete" records as required by each of the independent claims at issue in the '984 and '510 patents. See Defs.' Ex. B ('984 patent), cl. 1, at 15:51-54; id., cl. 13, at 16:46-50; Defs.' Ex. C ('510 patent), cl. 16, at 17:13-16. Openet is therefore also entitled to summary judgment of non-infringement of the '984 and '510 patents.

3. The '797 patent

Unlike the three other patents-in-suit, the '797 patent does not claim the system and its distributed architecture. The '797 patent instead claims a means of structuring the generated DRs that "permits improved versatility and performance." Defs.' Ex. A ('797 patent) at 2:6-8. Specifically, the invention is a method or a computer program for creating "[a] single consolidated record that rolls up information related to services, e-business transactions, content accesses, and information inquiries, etc." Id. at 4:60-63; see also id. fig.

6. This "unique manner" of organizing usage data for a plurality of services into a single record increases the efficiency of the overall system claimed by the other three patents-in-suit, by "allow[ing] usage data to be processed close to a collection point." Id. at 4:66-5:2.

a. Construction of a "single record represent[ing] each of the plurality of services"

The term "single record" is an important focus of all of the asserted independent claims in the '797 patent. Claim 1 is representative of the other independent claims and provides:

> A method for generating a single record reflecting multiple services for accounting purposes, comprising:
> (a) identifying a plurality of services carried out over a network;
> (b) collecting data describing the plurality of services; and
> (c) generating a single record including the collected data, wherein the single record represents each of the plurality of services.

Defs.' Ex. A ('797 patent), cl. 1, at 16:30-37; see also id., cl. 7, at 16:52-62 (computer program product); id., cl. 19, at 18:26-45.

Amdocs proposes that "single record" be interpreted simply as "one record." Pl.'s Opp'n at 4. Openet counters that the proper definition based on the specification is "[a] rolled up record reflecting all collected data fields," pointing out that the specification describes a particular single record to be generated by the system. Defs.' Mot. for Summ. J. at 9.

The '797 patent explains that many services can be offered over a network such as the Internet. Defs.' Ex. A ('797 patent) at 1:29-30. These services can include web browsing, e-mail, or voice over Internet Protocol. Id. at 1:31-32. Records of customers' usage of these services can be collected from network devices or aggregators, then grouped by service. Id. at 4:3-5, 4:14-17. That is, each group of records represents all usage of a particular service: one group contains all collected records of all customers' web browsing, another contains the records for e-mail usage, and a third contains the records for voice over Internet Protocol usage. The records in these groups are then correlated with information mapping particular IP addresses to particular customers. Based on the correlation, new records are generated that include customer information and the customer's usage data for one particular service. Id. at 4:25-32. For example, one record could include a customer's username and that customer's e-mail usage data while another record could contain that same customer's username with that customer's voice over Internet Protocol usage data. These records can then be "rolled up" into a single record that includes the customer's identifying information and the data representing the customer's use of all applicable services; in this example a single record would contain the customer's username, the customer's usage data for e-mail, and the customer's usage data for voice over

Internet Protocol. Id. at 4:33-35. The benefit of this "rolled up record" is that it "allows usage data to be processed close to a collection point by organizing it in a unique manner, namely a single record"; that is, it facilitates the important distributed architecture of the system. Id. at 4:65-5:2.

Importing all of this context into the term "single record," however, is inappropriate; the term standing alone is better construed simply as "one record." The proper use of the description in the specification is for interpreting the rest of the limitation: a "single record represent[ing] each of the plurality of services." Id. at 16:35-37.[18] Accordingly, the Court finds that a "single record represent[ing] each of the plurality of services" should be construed to mean "one record that includes customer usage data for each of the plurality of services used by the customer on the network."

Openet's construction, "a rolled up record reflecting all collected data fields," is inappropriate because nothing in the specification requires that the record reflect all collected data fields. In particular, if the records are collected directly from the network devices, see Defs.' Ex. A ('797 patent) at 4:3-5, they may include superfluous data. Although the specification does not expressly state that unnecessary data

[18] Openet apparently concedes this point by using the heading "Single record represent[ing] each of the plurality of services." Defs.' Mot. for Summ. J. at 21.

will be filtered when the records are "rolled up," neither does it support the argument that unnecessary data cannot be filtered. The specification, like the claim language, is focused on explaining that the generated single record will "include data of all the services associated with each of the particular companies [customers]." Id. at 4:33-35. The proper construction is therefore likewise focused on the inclusion of the applicable services rather than on the fields of data that were collected.

b. No evidence of '797 patent infringement

Openet argues that FusionWorks does not generate a single record representing each of the plurality of services. Amdocs responds with the following evidence:

- Two quotes from the deposition testimony of Dr. Michael Shamos, Openet's technical expert. Pl.'s Opp'n at 22 (quoting Pl.'s Ex. 13 (Shamos Dep. Tr.) at 264:3-5, 273:7-15).
- A diagram that purportedly "correlates data reflecting multiple services - i.e., Instant Messaging, and Multi-Media Messaging - into a single record for downstream billing purposes." Id. (citing Pl.'s Ex. 34, at OPENET00179758).
- A proposal to PTC Era stating that "the accused products can correlate 'multiple and seemingly disparate usage data streams into a singular granular usage record . . . for transmission to downstream applications." Id. at 21 (quoting Pl.'s Ex. 33, at OPENET00599273).

Specifically, Amdocs contends that Dr. Michael Shamos "admitted that Openet products contain code for generating a single record

for multiple services." Id. at 22. There are two snippets of relevant deposition testimony. The first is:

> Q: The Openet system can generate a single record for voice and data, right, for the use of voice and data, correct?
> A: I don't know that.
> Q: You know that it can generate a single record representing multiple services, right?
> A: Yes, mm-hmm.
> Q: And so you don't know whether those multiple services can include voice?
> A: Wait. The single record has to contain information about each of the services. My understanding is that it doesn't break them up that way. It just gives a bit count.
> Q: It gives a bit count that is a -- that reflects multiple services. Fair?
> A: A single bit count that reflects. It's the total of them, yes.
> Q: It's the total of multiple services, correct?
> A: Yes.

Pl.'s Ex. 13 (Shamos Dep.) at 263:21-264:11. The second snippet sounds the same themes:

> Q: Do the Openet accused products generate records that contain information for multiple services?
> A: Here's my understanding: That they generate records that contain total bit counts for more than one service.
> Q: All right.
> A: Let's say a total bit count for more than one service. Not total bit counts. One count.

Id. at 273:7-15.

The particular quoted passage in which Dr. Shamos appears to agree that Openet's products generate a single record representing multiple services, id. at 264:3-5, is taken out of context. His testimony is consistent: Openet's products

aggregate the volume of data that is used by multiple services and create a single record including that total volume, or "bit count." As an example, a mobile phone user could use the data network for instant messaging (IM) and for multimedia messaging (MMS). Using each of those services generates distinct sets of data records documenting that usage. These records would also document the volume of data used for each service; for example, a customer's IM session used 10 megabytes and that same customer's MMS session used 100 megabytes. If Openet's products work as Dr. Shamos testified, in this example they would generate a single record documenting that the customer had used 110 megabytes of data; that single record would not, however, break down that total volume into 100 megabytes for MMS and 10 megabytes for IM.

Such a record is not the single record described in the '797 patent, which requires that a single record "represents <u>each</u> of the plurality of services." Defs.' Ex. A ('797 patent) at 16:35-37 (claim 1) (emphasis added); <u>see also</u> <u>id.</u> at 16:60-62 (claim 7); <u>id.</u> at 18:37-38 (claim 19). Instead, as Dr. Shamos clearly testified, the Openet record "represents the totality" of a customer's usage of a plurality of services. Pl.'s Ex. 13 (Shamos Dep.) at 266:11-12. Indeed, Openet's records are well-described in the prior art distinguished by the '797 patent. The '797 patent provides that one example of prior art is "a

generic single service data block [that] may be used to account for common information, i.e. an account identifier, start time, duration, service identifier, etc." Defs.' Ex. A ('797 patent) at 1:61-63. Another piece of information that could be included in such a generic data record is the volume of data used during that session. Aggregating two such records, which may happen to be from different services, and creating a single record of the sum of the data volume fields is not the invention claimed by the patent. The patent takes a different approach, which is to organize the data "in a unique manner." Id. at 5:1-2. Specifically, the data are organized such that each of the services is represented in the single record. See, e.g., id. fig. 6 (showing a table with columns labeled "AccountD," "StartTime," "Duration," "HTTP Bytes," "HTTP Duration, "MailBytes," and "MailBytes"); id. fig. 706 (showing a table with columns labeled "VOIP Packets," "VOIP Time," "SMTP Traffic," and "Corp Balance"). Accordingly, Dr. Shamos' testimony does not create a genuine dispute of material fact as to whether Openet's products infringe the '797 patent.

The diagram Amdocs claims creates a genuine issue of material fact as to infringement is from a document titled "Instant Messaging: Technical Specification" that Openet states was created as a "proposal Openet made to Cingular in 2003." Defs.' Reply at 14. Regardless of whether the document is a

mere proposal or a description of current functionality, nothing in the diagram or the included excerpt of the document establishes that Openet's products generate a single record representing each of a plurality of services. The text does state, and the diagram illustrates, that the data collected from four usage streams, including MMS Content Server and Instant Messaging, are entered into separate database tables. See Pl.'s Ex. 34, at OPENET00179758. The data within each of these tables are then correlated. Id. The correlation of these data, however, does not support a reasonable inference that they are thereafter combined into a single record representing each of the plurality of services. The explanation on the next page, though not a model of clarity, suggests instead that the purpose of the correlation is to create a record of the total data volume as explained in Dr. Shamos' testimony; it does not suggest that the system creates a record representing both IM and MMS usage. See id. at OPENET00179759 ("All data from this stream is aggregated on IP address, charging ID, IMSI and timestamp to form a single record, which contains the total data volume used to deliver the MMS."). This exhibit thus also fails to demonstrate a genuine issue of material fact.

Finally, Amdocs points to a proposal Openet made to a Polish company. Because as discussed above infringement must occur within the United States to be actionable, this proposal

cannot create a genuine issue of material fact for trial. Additionally, even if the document described systems operating within the United States, it would not create a genuine issue of material fact as to infringement of the '797 patent. The quoted text provides that the accused product "is ideal for correlating the multiple and seemingly disparate usage streams into a singular granular usage record or IPDR for transmission to downstream applications . . . ." Pl.'s Ex. 33, at OPENET00599273. But in context, the "usage streams" do not come from different services, but from different network information sources. The sentence immediately preceding explains that "it is often required to correlate data from very different sources such as Radius servers, Media/Content Gateways, IP Routers, firewalls, AAA servers, Content servers and other transport network elements." Id. These listed "sources" are the network devices that form the network and provide connectivity, not "services" used by customers such as instant messaging, web browsing, e-mail, or voice over Internet Protocol. Nothing in the proposal suggests that the output of the system includes usage data for each service used by a customer, as required by the '797 patent.

Accordingly, Amdocs has not presented even a scintilla of evidence that creates a genuine issue of material fact as to whether the accused products generate a "single record

represent[ing] each of the plurality of services." Because this limitation is included in each of the asserted independent claims of the '797 patent, summary judgment of non-infringement is appropriate. Resolving the parties' dispute over whether Openet's Graphical User Interface infringe other claims in the '797 patent, see Defs.' Mot. for Summ. J. at 24; Pl.'s Opp'n at 18-21; Defs.' Reply at 12-13, is therefore unnecessary.

C. Inequitable Conduct

Openet has filed counterclaims alleging that all four patents are unenforceable due to Amdocs' purported inequitable conduct before the PTO.

An inequitable conduct defense requires the defendant to "establish both the materiality of the withheld reference and the applicant's intent to deceive the PTO." Aventis Pharma S.A. v. Hospira, Inc., 675 F.3d 1324, 1334 (Fed. Cir. 2012). On the day before opening summary judgment motions were due in this action, the Federal Circuit, sitting en banc, "tighten[ed] the standards for finding both intent and materiality," observing that the more lenient standards it had previously "embraced . . . to foster full disclosure to the PTO," had "inadvertently led to many unintended consequences, among them, increased adjudication cost and complexity, reduced likelihood of settlement, burdened courts, strained PTO resources, increased PTO backlog, and impaired patent quality."

Therasense, Inc. v. Becton, Dickinson & Co., 649 F.3d 1276, 1290, 1288 (Fed. Cir. 2011) (en banc).

Accordingly, for the materiality element, the court imposed a "but-for" standard except in cases of "affirmative egregious misconduct." Id. at 1291-92. "But-for" materiality is met only when "the PTO would not have allowed a claim had it been aware of the undisclosed prior art." Id. at 1291. As to specific intent, the Therasense court reiterated that "the accused infringer must prove by clear and convincing evidence that the applicant knew of the reference, knew that it was material, and made a deliberate decision to withhold it." Id. at 1290. The court also heightened the evidentiary showing needed to make that proof, stating that "when there are multiple reasonable inferences that may be drawn, intent to deceive cannot be found." Id. at 1290-91. Rather, intent to deceive must be "the single most reasonable inference to be drawn from the evidence," and the evidence "must be sufficient to require a finding of deceitful intent in the light of all the circumstances." Id. at 1290 (quoting Star Scientific Inc. v. R.J. Reynolds Tobacco Co., 537 F.3d 1357, 1366 (Fed. Cir. 2008); Kingsdown Med. Consultants, Ltd. v. Hollister Inc., 863 F.2d 867, 873 (Fed. Cir. 1988)) (internal quotation marks omitted) (emphasis in original). Finally, the court rejected the "sliding scale" approach, "where a weak showing of intent may be found

sufficient based on a strong showing of materiality, and vice versa." Id. Instead, "a court must weigh the evidence of intent to deceive independent of its analysis of materiality." Id.

Openet Inc.'s first inequitable conduct counterclaim alleges that during the prosecution of the '065 patent, the patentees deliberately withheld U.S. Patent No. 5,784,443 ("the '443 patent") from the PTO with the intent to deceive the patent examiner. Id. ¶¶ 45, 48-50. The counterclaim further alleges that the '443 patent anticipated the '065 patent and was therefore material prior art, id. ¶ 47, and concludes that the '065 patent is unenforceable for inequitable conduct, id. ¶ 53. The second such counterclaim alleges that all four patents-in-suit are unenforceable due to inequitable conduct because the patentees, intending to deceive the PTO, withheld information about earlier, publicly available versions of the patented XaCCT system that anticipated or made obvious the patented claims. Id. ¶¶ 83-99.

Amdocs argues that "Openet lacks any evidence that could create a legitimate dispute of material fact as to the intent element of inequitable conduct." Pl.'s Mot. for Partial Summ. J. at 30. Openet responds that the intent inquiry is "fact-intensive" and claims to have "sufficient evidence to create a

triable issue of fact as to whether the patentee specifically intended to deceive the PTO." Defs.' Opp'n at 19.

Openet's argument is without merit. Although intent is an "inherently factual" inquiry, Digital Control, Inc. v. Charles Mach. Works, 437 F.3d 1309, 1317 (Fed. Cir. 2006), summary judgment is nonetheless appropriate when "the record taken as a whole could not lead a rational trier of fact to find for the nonmoving party." Matsushita, 475 U.S. at 587. Moreover, "the inquiry involved in a ruling on a motion for summary judgment . . . necessarily implicates the substantive evidentiary standard of proof that would apply at the trial on the merits." Liberty Lobby, 477 U.S. at 252. Especially considering the heightened Therasense requirements and the clear and convincing evidence standard of proof, Openet has not presented sufficient evidence to create a triable issue of fact as to specific intent to deceive the PTO, even drawing all inferences in its favor.

Beginning with the patentees' withholding of the '443 patent during the prosecution of the '065 patent, Openet has no evidence that the '443 patent was withheld with the specific intent to deceive the PTO. Openet argues that deceptive intent can be inferred because (1) the '443 patent is material prior art, (2) it was known to at least the prosecuting attorney, (3) the prosecuting attorney submitted other references cited by

the patent examiner in the same PTO office action as the '443 patent, and (4) the prosecuting attorney had no explanation for why he withheld the '443 patent. Defs.' Opp'n at 24-25. Even assuming the truth of each of these contentions, this argument fails because it precisely mirrors what Therasense indicated does not prove specific intent to deceive, namely "that the applicant knew of a reference, should have known of its materiality, and decided not to submit it to the PTO." 649 F.3d at 1290. Further, the prosecuting attorney owes no explanation about why the '443 patent was withheld because Openet has failed to prove even a threshold level of intent to deceive. See id. at 1291 ("Because the party alleging inequitable conduct bears the burden of proof, the patentee need not offer any good faith explanation unless the accused infringer first . . . prove[s] a threshold level of intent to deceive by clear and convincing evidence." (quoting Star, 537 F.3d at 1368) (omission and alteration in original)).

Turning to the withheld earlier versions of the XaCCT software, Openet similarly relies on an argument that those earlier versions were material and on the absence of an explanation from Amdocs about why they were withheld. Defs.' Opp'n at 21-23. Openet's only additional piece of evidence for this argument is the loss or destruction, sometime between 2007 and 2010, of the box containing documents describing those

previous versions. Id. at 24; id. Ex. M at 60:3-17. Although this loss or destruction might be consistent with bad faith, it is also reasonable to infer that the documents were simply lost through ordinary negligence. Because "multiple reasonable inferences [] may be drawn" from this evidence, "intent to deceive cannot be inferred." Therasense, 649 F.3d at 1290-91. Credibility determinations are not necessary because the evidence is barely relevant to patentees' specific intent to deceive the PTO. Openet's offering on intent to deceive is therefore insufficient to defeat Amdocs' motion for summary judgment of no inequitable conduct, as the evidence presented could only charitably be described as a "scintilla." See Liberty Lobby, 477 U.S. at 252.

Finally, the change in policy that Therasense effectuated would be eroded if the heightened burden of proof applied only at trial, as the court expressly sought to limit the extent to which inequitable conduct allegations are raised in the first instance. See 649 F.3d at 1289 ("Inequitable conduct has been overplayed, is appearing in nearly every patent suit, and is cluttering up the patent system. The habit of charging inequitable conduct in almost every major patent case has become an absolute plague." (quoting Kimberly-Clark Corp. v. Johnson & Johnson, 745 F.2d 1437, 1454 (Fed. Cir. 1984); Burlington Indus., Inc. v. Dayco Corp., 849 F.2d 1418, 1422 (Fed. Cir.

1988)) (internal quotation marks omitted)). Summary judgment of no inequitable conduct in this case is therefore eminently appropriate.

III. CONCLUSION

For all these reasons, final judgment will now be entered in favor of Openet as to Amdocs' infringement claims, final judgment will be entered in favor of Amdocs as to Openet's inequitable conduct counterclaims, and Openet's invalidity counterclaims will be dismissed without prejudice by an appropriate Order to be issued with this Memorandum Opinion.

Entered this 22nd day of January, 2013.

Alexandria, Virginia

/s/ LMB

Leonie M. Brinkema
United States District Judge

IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff, v. OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., An Irish Corporation, Defendants.	Case No. 1:10-cv-910 (LMB/TRJ) **JURY TRIAL DEMANDED**

OPENETS' MOTION FOR JUDGMENT ON THE PLEADINGS THAT
AMDOCS' ASSERTED PATENT CLAIMS ARE INVALID UNDER 35 U.S.C. § 101

Defendants Openet Telecom, Inc. and Openet Telecom Ltd. (collectively "Openet") respectfully ask that, in view of the significant intervening case law concerning the patent eligibility of software patents since the parties last appeared before the district court, the Court grant judgment on the pleadings pursuant to Fed. R. Civ. P. 12(c) that Amdocs (Israel) Ltd.'s ("Amdocs") asserted patents claims are now invalid under 35 U.S.C. § 101. The Court should entertain, and grant, this motion for three reasons:

First, as set forth in the attached memorandum, the Supreme Court's June 2014 decision in *Alice Corp. Pty. Ltd. v. CLS Bank Int'l* significantly expanded the reach of Section 101 in invalidating software patents. 134 S. Ct. 2347 (2014). Even a senior partner from the law firm representing Amdocs admitted to the *Wall Street Journal* that the Supreme Court "has changed things fundamentally." *See* Ashby Jones, *Courts Nix More Software Patents*, WALL ST. J., Sept. 21, 2014. Before *Alice*, the Federal Circuit was deeply fractured on Section 101 issues, but with

the clarity the Supreme Court has now provided, district courts are taking a new hard look at software patents and finding them invalid. The Amdocs patent claims are directed to the very type of abstract idea (e.g., processing network usage data) implemented using generic computer equipment (e.g., servers) that courts have resoundingly concluded are now invalid under 35 U.S.C. § 101. [1]

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[1] Counsel for Openet is aware of at least the following decisions invalidating software patents under Section 101 since the *Alice* decision three months ago: *Digitech Image Techs., LLC v. Elecs. For Imaging, Inc.*, 758 F.3d 1344, 1349 (Fed. Cir. 2014) (holding a "device profile" within a digital image processing system "is not a tangible or physical thing and thus does not fall within any of the categories of eligible subject matter"); *Planet Bingo, LLC, v. VKGS, LLC*, No. 2013-1663, 2014 WL 4195188, at *1, 3 (Fed. Cir. Aug. 26, 2014) (invalidating claims that "recite computer-aided methods and systems for managing the game of bingo" because "the claims recite a generic computer implementation of the covered abstract idea"); *buySAFE, Inc. v. Google, Inc.*, No. 2013-1575, 2014 WL 4337771, at *5 (Fed. Cir. Sept. 3, 2014) ("That a computer receives and sends the information over a network—with no further specification—is not even arguably inventive."); *Comcast IP Holdings I, LLC v. Sprint Commc'ns Co*., C.A. No. 12-205-RGA, 2014 WL 3542055, at *5 (D. Del. July 16, 2014) (invalidating a claim of the patent-at-issue because it "merely covers the application of what has for a long time been conducted solely in the mind to modern, computerized, telephony networks"); *DietGoal Innovation, LLC v. Bravo Media, LLC*, No. 13 Civ. 8391 (PAE), 2014 WL 3582914, at *14 (S.D.N.Y July 8, 2014) (invalidating the patent-at-issue because it "do[es] no more than 'simply instruct the practitioner to implement the abstract idea . . . on a generic computer'") (quoting *Alice*, 134 S.Ct. at 2359); *CMG Fin. Servs., Inc. v. Pacific Trust Bank, F.S.B.*, C.A. No. 11-10344 PSG, slip. op., at 10 (C.D. Cal. Aug. 29, 2014) ("[W]hether the claimed methods and systems can be completed on a piece of paper or require the use of a specialized banking computer, are insignificantly probative to a collateral issue or are entirely irrelevant to our § 101 analysis . . . ."); *Loyalty Conversion Sys., Corp. v. Am. Airlines, Inc.*, No. 2:13-cv-655, 2014 WL 4364848, at *2-5 (E.D. Tex. Sept. 2, 2014) (invalidating patents claiming "a method enabling a customer to convert loyalty award credits" and "a method in which a computer provides one or more Web pages that can be used by clients to convert non-negotiable loyalty award points," explaining that the patents-at-issue are "not fundamentally different from the kinds of commonplace financial transactions that were the subjects of the Supreme Court's recent decisions" in *Bilski* and *Alice*); *Walker Digital, LLC v. Google, Inc.*, No. 11-318, 2014 WL 4365245, at *6 (D. Del. Sept. 3, 2014) ("Even accepting that the use of a computer increases speed and efficiency of performing the steps of the claims, and improves the likelihood of preserving the anonymity of the first and second parties, these characteristics do not save the claims."); *Tuxis Techs., LLC v. Amazon.com, Inc.*, No. 13-1771, 2014 WL 4382446, at *1, 5 (D. Del. Sept. 3, 2014) (invalidating a claim reciting a "method for providing offers in real time . . . utilizing an electronic communications device . . ." because "[t]he computer performs nothing more than purely conventional

Second, Section 101 invalidity issues are uniquely amenable to resolution under Rule 12. Judge Mayer went so far as to declare that Section 101 is now a threshold issue whose resolution must precede other issues – "[u]ntil it is determined that claimed subject matter is even *eligible* for patent protection, a court has no warrant to consider subordinate validity issues." *I/P Engine, Inc. v. AOL, Inc.*, 2013-1307, 2014 WL 3973501, at *11 (Fed. Cir. Aug. 15, 2014) (Mayer, J. concurring). Other Federal Circuit judges take that same view. For example, Judge Bryson, sitting by designation in the Eastern District of Texas, recently granted a motion for judgment on the pleadings regarding invalidity under Section 101. *See Loyalty Conversion Sys. Corp. v. Am. Airlines, Inc.*, No. 13-cv-655, 2014 WL 4364848, at *4 (E.D. Tex. Sept. 2, 2014).

Third, now is the procedurally proper time to address Section 101 issues. The parties do not appear before the Court for a status conference until October 16, 2014. No trial date has been set, and the parties have not yet incurred additional time and expense on supplemental fact and expert discovery and preparing again for trial. Therefore, this motion will not unduly delay the case. To the contrary, it will help significantly narrow issues and likely moot the need for any trial at all by confirming that the Amdocs patents are invalid under the new Section 101 case law. As set forth in the attached memorandum, Openet simply asks that this Court follow the lead of the Federal Circuit and numerous other district courts in granting Rule 12(c) motions following *Alice* to "spare both [the] litigants and [the] courts years of needless litigation." *I/P Engine*, 2014 WL 3973501, at *12.

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steps that are well-understood, routine, and previously known to the industry"); *Eclipse IP LLC v. McKinley Equip. Corp.*, No. 14-cv-154, 2014 WL 4407592, at *6-7 (C.D. Cal. Sept. 4, 2014) (invalidating a patent claiming a "method for communications in connection with a computer-based notification system," and explaining that the *Alice* "analysis fits the [patent's] claims precisely"); *Every Penny Counts, Inc. v. Wells Fargo Bank, N.A.*, No. 8:11-cv-2826, 2014 WL 4540319, at *5 (M.D. Fla. Sept. 11, 2014) (relying on *Alice* to invalidate a method of and a system of automated saving or automated charitable giving).

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Dated: September 26, 2014

Respectfully submitted,

/s/ Brian H. Pandya

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CERTIFICATE OF SERVICE

I hereby certify that on this 26th day of September, 2014, I caused the foregoing document to be served on the following counsel for Amdocs (Israel) Limited via the Court's CM/ECF system:

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**IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION**

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff, v. OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., An Irish Corporation, Defendants.	Case No. 1:10-cv-910 (LMB/TRJ) **JURY TRIAL DEMANDED**

DEFENDANTS' MEMORANDUM IN SUPPORT OF THEIR MOTION FOR JUDGMENT ON THE PLEADINGS THAT AMDOCS' ASSERTED PATENT CLAIMS ARE INVALID UNDER 35 U.S.C. § 101

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I. INTRODUCTION

In June 2014, the Supreme Court, in *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014), expanded the reach of *Bilski v. Kappos*, 130 S. Ct. 3218 (2010), and unanimously declared that patent claims directed to abstract ideas (e.g., processing network usage data) and implemented using generic computer equipment (e.g., servers) are invalid under 35 U.S.C. § 101. As a senior partner from the law firm representing Amdocs told the Wall Street Journal on September 21, 2014, the Supreme Court "has changed things fundamentally."[1] Judge Mayer recently observed that § 101 is now a threshold issue whose resolution must precede other issues – "[u]ntil it is determined that claimed subject matter is even eligible for patent protection, a court has no warrant to consider subordinate validity issues." *I/P Engine, Inc. v. AOL, Inc.*, No. 2013-1307, 2014 WL 3973501, at *11 (Fed. Cir. Aug. 15, 2014) (Mayer, J. concurring).

Since *Alice*, numerous data processing patents with claims very similar to the Amdocs patent claims have failed to clear this new threshold and have been declared invalid as a matter of law. The asserted Amdocs patent claims, attached hereto as Exhibit 1-4, should be declared invalid before the Court and the parties needlessly expend additional resources on claim construction and preparing for trial on non-infringement and invalidity under 35 U.S.C. §§ 102, 103, and 112:

- U.S. Pat. No. 7,631,065 ("the '065 patent") (Ex. 1) claims the abstract idea of correlating and enhancing one networking accounting record with data from a second record;
- U.S. Pat. Nos. 7,412,510 ("the '510 patent") (Ex. 2) and 6,947,984 ("the '984 patent") (Ex. 3) claim the abstract idea of collecting and completing network usage information to create a database that can be queried and that can generate reports and alerts; and

[1] Ashby Jones, *Courts Nix More Software Patents*, WALL ST. J. (Sept. 21, 2014), *available at* http://online.wsj.com/articles/federal-courts-reject-more-software-patents-after-supreme-court-ruling-1411343300.

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- U.S. Pat. No. 6,836,797 ("the '797 patent") (Ex. 3) claims the abstract idea of collecting data and creating a single accounting record from that data.

Amdocs' asserted claims "add nothing of substance to the underlying abstract idea," as they merely claim rearranging data conventionally collected from a telecommunications network. *See Alice*, 134 S. Ct. at 2360. The claims cannot survive post-*Alice* scrutiny.

Amdocs' patent claims also suffer from the additional flaw that they are implemented using conventional telecommunications equipment. As explained below, the patent specifications describe using ordinary hardware and software, such as servers, databases, and graphic user interfaces, to implement the claimed inventions. Because the Amdocs patents claim using "a generic computer to perform generic computer functions" to implement an abstract idea, the Amdocs patents also cannot survive § 101 scrutiny for that reason. *See id.* at 2359.

In view of the fundamental change in the law of § 101 patent eligibility since the parties last appeared before this Court, Rule 12(c) provides an efficient tool to dispose of Amdocs' invalid patent claims. Patent eligibility is a threshold question of law that, unlike the infringement and other invalidity issues still remaining before the Court, does not require claim construction or further discovery. This Court should follow the lead of its numerous brethren in granting Rule 12(c) motions following *Alice* and "spare both [the] litigants and [the] Courts years of needless litigation." *I/P Engine, Inc.*, 2014 WL 3973501, at *12. Proceeding differently would run against how nearly every other court has handled § 101 issues since *Alice*.

II. APPLICABLE LAW

A. Patentable Subject Matter Under 35 U.S.C. § 101

It has long been clear that § 101 bars patents directed to abstract ideas. *See, e.g.*, *Bilski*, 130 S. Ct. at 3225 ("The Court's precedents provide three specific exceptions to § 101's broad patent-eligibility principles: 'laws of nature, physical phenomena, and abstract ideas.'"). Only

recently, however, did the Supreme Court lend clarity to the question of whether implementing an abstract idea using a computer is patent eligible – concluding, emphatically, that it is not. *See Alice*, 134 S. Ct. at 2358 ("[T]he mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention.").

Alice provides a two-step "framework for distinguishing patents that claim . . . abstract ideas from those that claim patent-eligible applications of those concepts." *Id.* at 2355. The first step is to determine whether the claim at issue is directed to an abstract idea. *Id*.

In many instances, the abstract idea is a "method of organizing human activity" (*id*. at 2356) – for example, methods for organizing and processing data. *See Planet Bingo, LLC v. VKGS LLC*, No. 2013–1663, 2014 WL 4195188, at *2 (Fed. Cir. August 26, 2014) ("[claim] recites the steps of selecting, storing, and retrieving two sets of numbers, assigning a player identifier and a control number, and then comparing a winning set of bingo numbers with a selected set of bingo numbers"); *Digitech Image Techs. LLC v. Elecs. For Imaging, Inc*., 758 F.3d 1344, 1350 (Fed. Cir. 2014) ("a process of organizing information through mathematical correlations"). Notably, a claimed process of organizing information using mathematical algorithms (computer code, for example) "to manipulate existing information to generate additional information is not patent eligible." *Digitech*, 758 F.3d at 1351.

The second step considers "whether the additional elements [of the claim] transform the nature of the claim into a patent-eligible application." *Alice*, 561 S. Ct. at 2355.[2] It is not enough to recite claims that simply use existing hardware and software components to collect and process data. Instead, to satisfy this second prong, the claim must include "an element or combination of elements that is sufficient to ensure that the patent in practice amounts to *significantly more* than a patent upon the [ineligible concept] itself." *Id*. (emphasis added).

[2] All internal citations have been omitted from cited quotations unless noted otherwise.

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This standard is not met when patent claims first recite an abstract idea and then include an instruction to "apply it" through the "the mere recitation of a generic computer." *Id*. at 2357-58. "Thus, if a patent's recitation of a computer amounts to a mere instruction to implement an abstract idea on a computer, that addition cannot impart patent eligibility." *Id*. at 2358.

Claims directed to methods, systems, and computer-readable media are all tested using the same two-step framework and rise and fall together. *See id.* at 2360 ("The concept of patentable subject matter under § 101 is not like a nose of wax which may be turned and twisted in any direction."); *see also CLS Bank Int'l v. Alice Corp. Pty. Ltd.*, 717 F.3d 1269, 1274 n.1 (Fed. Cir. 2013) (*en banc*) ("[E]ight judges, a majority, have concluded that the particular method, medium, and system claims at issue in this case should rise or fall together in the § 101 analysis."). Thus, if the Court finds that Amdocs' method claims are invalid, the counterpart system and computer-readable media claims must also be invalidated.

B. Rule 12(c) Is The Best Procedural Vehicle To Address § 101 Issues

Rule 12(c) provides that "[a]fter the pleadings are closed – but early enough not to delay trial – a party may move for judgment on the pleadings." Here, the parties are scheduled to appear before the Court on October 16, 2014 for a status conference but no trial date has been set. Early resolution of the § 101 issue will prevent unnecessary supplemental discovery, pretrial motions, and possibly even trial itself. These circumstances, and the fact that the decision in *Alice* was made three months ago while this case was still pending before the Federal Circuit, demonstrate that this motion is presented early enough not to delay trial.

Invalidity under § 101 is a question of law. *Accenture Global Servs., GmbH v. Guidewire Software, Inc.*, 728 F.3d 1336, 1340-41 (Fed. Cir. 2013). Because § 101 challenges often do not involve disputed issues of fact or require claim construction, since the Supreme Court's *Alice* decision, various district courts have addressed § 101 issues under Rule 12(c). *See,*

e.g., *Open Text S.A. v. Alfresco Software Ltd.*, No. 13-cv-04843-JD, 2014 WL 4684429, at *3 (N.D. Cal. Sept. 19, 2014) ("It is not necessary in every case to construe the patent claims prior to determining subject matter eligibility."); *Eclipse IP LLC v. McKinley Equip. Corp.*, No. SACV 14–742–GW(AJWx), 2014 WL 4407592, at *6 (C.D. Cal Sept. 4, 2014) ("[N]either separate claim construction proceedings nor further development of the factual record are required before addressing the § 101 issue."); *see also buySAFE, Inc. v. Google, Inc.*, 964 F. Supp. 2d 331 (D. Del. 2013) (judgment on the pleadings) ("The Court's claim construction ruling, which is being issued separately today, has *no impact* on Defendant's Rule 12(c) motion.") (emphasis added), *aff'd*, No. 2013–1575, 2014 WL 4337771 (Fed. Cir. Sept. 3, 2014).

III. ARGUMENT

In the weeks since *Alice*, district courts and the Federal Circuit have repeatedly invalidated computerized data processing patents that are similar to Amdocs' asserted claims.[3]

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[3] *See, e.g.*, *Digitech Image Techs., LLC v. Elecs. For Imaging, Inc.*, 758 F.3d 1344, 1349 (Fed. Cir. 2014) (finding that a "device profile" within a digital image processing system "is not a tangible or physical thing and thus does not fall within any of the categories of eligible subject matter"); *Planet Bingo, LLC, v. VKGS, LLC*, No. 2013-1663, 2014 WL 4195188, at *1, 3 (Fed. Cir. Aug. 26, 2014) (invalidating claims that "recite computer-aided methods and systems for managing the game of bingo" because "the claims recite a generic computer implementation of the covered abstract idea"); *buySAFE, Inc. v. Google, Inc.*, No. 2013-1575, 2014 WL 4337771, at *5 (Fed. Cir. Sept. 3, 2014) ("That a computer receives and sends the information over a network—with no further specification—is not even arguably inventive."); *Comcast IP Holdings I, LLC v. Sprint Commc'ns Co.*, C.A. No. 12-205-RGA, 2014 WL 3542055, at *5 (D. Del. July 16, 2014) (invalidating a claim of the patent-at-issue because it "merely covers the application of what has for a long time been conducted solely in the mind to modern, computerized, telephony networks"); *DietGoal Innovation, LLC v. Bravo Media, LLC*, No. 13 Civ. 8391 (PAE), 2014 WL 3582914, at *14 (S.D.N.Y July 8, 2014) (invalidating the patent-at-issue because it "do[es] no more than 'simply instruct the practitioner to implement the abstract idea . . . on a generic computer'") (quoting *Alice*, 134 S.Ct. at 2359); *CMG Fin. Servs., Inc. v. Pacific Trust Bank, F.S.B.*, C.A. No. 11-10344 PSG, slip. op., at 10 (C.D. Cal. Aug. 29, 2014) ("[W]hether the claimed methods and systems can be completed on a piece of paper or require the use of a specialized banking computer, are insignificantly probative to a collateral issue or are entirely irrelevant to our § 101 analysis . . . ."); *Loyalty Conversion Sys., Corp. v. Am. Airlines, Inc.*, No. 2:13-cv-655, 2014 WL 4364848, at *2-5 (E.D. Tex. Sept. 2, 2014) (invalidating patents claiming "a method enabling a customer to convert

One district court even observed that at this point it would be odd to uphold the validity of a software patent. *Every Penny Counts, Inc. v. Wells Fargo Bank N.A.*, C.A. No. 8:11–cv–2826–T–23TBM, 2014 WL 4540319, at *4 n.4 (M.D. Fla. Sept. 11, 2014) ("Conspicuously, the Supreme Court vacated the only Federal Circuit opinion, *Ultramercial*, upholding a software patent and declined certiorari over the two actions, *Bancorp* and *Accenture*, that invalidate software patents."). This Court should similarly invalidate Amdocs' asserted claims.

A. **The Asserted Claims Of The '065 Patent Are Directed To Patent-Ineligible Subject Matter And Are Invalid Under § 101**

Amdocs asserts claims 1, 4, 7, 13 and 17 of the '065 patent. Independent claim 1, which is representative of all asserted independent claims, reads as follows:

> 1. A computer program product embodied on a computer readable storage medium for processing network accounting information comprising:

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loyalty award credits" and "a method in which a computer provides one or more Web pages that can be used by clients to convert non-negotiable loyalty award points," explaining that the patents-at-issue are "not fundamentally different from the kinds of commonplace financial transactions that were the subjects of the Supreme Court's recent decisions" in *Bilski* and *Alice*); *Walker Digital, LLC v. Google, Inc.*, No. 11-318, 2014 WL 4365245, at *6 (D. Del. Sept. 3, 2014) ("Even accepting that the use of a computer increases speed and efficiency of performing the steps of the claims, and improves the likelihood of preserving the anonymity of the first and second parties, these characteristics do not save the claims."); *Tuxis Techs., LLC v. Amazon.com, Inc.*, No. 13-1771, 2014 WL 4382446, at *1, 5 (D. Del. Sept. 3, 2014) (invalidating a claim reciting a "method for providing offers in real time . . . utilizing an electronic communications device . . ." because "[t]he computer performs nothing more than purely conventional steps that are well-understood, routine, and previously known to the industry"); *Eclipse IP LLC v. McKinley Equip. Corp.*, No. 14-cv-154, 2014 WL 4407592, at *6-7 (C.D. Cal. Sept. 4, 2014) (invalidating a patent claiming a "method for communications in connection with a computer-based notification system," and explaining that the *Alice* "analysis fits the [patent's] claims precisely"); *Every Penny Counts, Inc. v. Wells Fargo Bank, N.A.*, No. 8:11-cv-2826, 2014 WL 4540319, at *5 (M.D. Fla. Sept. 11, 2014) (relying on *Alice* to invalidate a method of and a system of automated saving or automated charitable giving); *Open Text S.A. v. Alfresco Software Ltd.*, No. 13-cv-04843-JD, 2014 WL 4684429, at *1, 5 (N.D. Cal. Sept. 19, 2014) (invalidating patents on "systems and methods for carrying on marketing dialogues" under *Alice*, explaining that "both patents implement the basic marketing scheme on a generic computer system without any meaningful limitations").

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computer code for receiving from a first source a first network accounting record;

computer code for correlating the first network accounting record with accounting information available from a second source; and

computer code for using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.

Independent claim 7 rewrites claim 1 as a method, while independent claim 13 rewrites it as a system. Dependent method claim 4 states that "the accounting information is in the form of a second network accounting record." Dependent system claim 17 states that the records are received and merged in "a module coupled to the plurality of data collectors."

The abstract idea of the '065 patent is correlating and enhancing network usage data, ostensibly to facilitate billing. In this regard, the asserted claims of the '065 patent bear a strong resemblance to claim 10 of U.S. Patent No. 6,128,415, held invalid in *Digitech Image Techs. LLC v. Elecs. For Imaging, Inc. See* 758 F.3d 1344 (Fed. Cir. 2014).

Method claim 7 of the Amdocs '065 patent and the nearly identical method claim 10 of the Digitech '415 patent are copied below:

Claim 7 – '065 Patent	**Claim 10 – '415 Patent**
A method of processing network accounting information comprising:	A method of generating a device profile that describes properties of a device in a digital image reproduction system for capturing, transforming or rendering an image, said method comprising:
receiving from a first source a first network accounting record;	generating first data for describing a device dependent transformation of color information content of the image to a device independent color space through use of measured chromatic stimuli and device response characteristic functions;

correlating the first network accounting record with accounting information available from a second source; and	generating second data for describing a device dependent transformation of spatial information content of the image in said device independent color space through use of spatial stimuli and device response characteristic functions; and
using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.	combining said first and second data into the device profile.

Just like the asserted claims of the ’065 patent, the invalidated claim in *Digitech* was directed to “a process of taking two data sets and combining them into a single data set, the device profile.” *Id.* at 1351. Concluding that the claim recited nothing more than the abstract idea of “taking existing information . . . and organizing this information into a new form,” the Federal Circuit affirmed a grant of summary judgment of invalidity under § 101. *Id.* Thus, there can be no reasonable dispute that the ’065 patent purports to claim an abstract idea. If anything, claim 10 of the ’415 patent included more detailed limitations than the claims of the ’065 patent.

The asserted claims of the ’065 patent also fail to include “an element or combination of elements to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.” *Alice*, 134 S. Ct. at 2355. In *Alice*, the patent similarly claimed creating and merging two data sets – “a shadow credit record” and “a shadow debit record” – necessary for exchanging credit obligations. *Id.* at 2352 n.2. The patentee argued that the claims should be rendered patentable because the claimed invention necessarily used computer software and hardware, but the Supreme Court unequivocally said that was not enough:

> Using a computer to create and maintain “shadow” accounts amounts to electronic recordkeeping—one of the most basic functions of a computer. The same is true with respect to the use of a computer to obtain data, adjust account balances, and issue automated instructions; all of these computer functions are well-understood, routine,

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> conventional activities previously known to the industry. In short, each step does no more than require a generic computer to perform generic computer functions.

Id. at 2359. Put simply, "using some unspecified, generic computer" to execute an abstract idea "is not '*enough*' to transform an abstract idea into a patent-eligible invention." *Id.* at 2360 (emphasis in original).

Like *Alice*, the asserted claims of the '065 patent require, at most, only conventional computer hardware and software. For example, claim 1 of the '065 patent generically recites "computer code," while claim 13 of the '065 patent generically recites "data collectors." The '065 patent specification similarly recites that "the gatherers can be a*ny hardware and/or software* that performs the functions of a gatherer." '065 Patent, Col. 6:59-60. The '065 patent also states that gatherers may "run on non-dedicated hosts, as a normal user application on Windows NT or Unix," *i.e.*, existing conventional software. *Id*. at 6:56-57.

There is nothing special about these elements. They do not purport to improve the functioning of the computer or effect an improvement in any technology or technical field. Every computer utilizes "computer code," and can function as a "data collector." *See Alice*, 134 S. Ct. at 2360 ("[W]hat petitioner characterizes as specific hardware—a 'data processing system' with a 'communications controller' and 'data storage unit'—is purely functional and generic."). Whether considered individually or in combination, the elements of the asserted claims of the '065 patent amount to nothing more than instructions to implement the abstract idea using conventional computer equipment.

Nor are the claims of the '065 patent rendered patent-eligible because they are directed to "network accounting information" or because they make efficient the generation of millions of such records. The former is a mere field of use limitation that cannot impart patent eligibility. *See Bilski*, 130 S. Ct. 3231 ("*Flook* established that limiting an abstract idea to one field of use or

adding token postsolution components did not make the concept patentable.”). The latter is irrelevant because the ***claims*** do not require the creation of millions of merged records; rather they require but one. *See, e.g.*, *Planet Bingo, LLC v. VKGS LLC*, No. 2013–1663, 2014 WL 4195188, at *2 (Fed. Cir. Aug. 26, 2014) (rejecting argument by patentee “that in real world use, literally thousands, if not millions of preselected Bingo numbers are handled by the claimed computer program, making it impossible for the invention to be carried out manually”).

In short, the asserted claims of the ’065 patent are directed to nothing beyond the abstract idea of merging information from two sources into one record. They add no inventive concept to the abstract idea, but rather “are mainly functional in nature, and nothing in the claims or the specification reveals how any of the functions are performed or suggests why any of those functions are not within the routine capacity of a generic computer with conventional programming.” *Loyalty Conversion Sys. Corp. v. Am. Airlines, Inc.*, No. 2:13-cv-655, 2014 WL 4364848, at *14 (E.D. Tex. Sept. 3, 2014).

“Given the ubiquity of computers, wholly generic computer implementation is not generally the sort of additional feature that provides any practical assurance that the process is more than a drafting effort designed to monopolize the abstract idea itself.” *Walker Digital, LLC v. Google, Inc.*, No. 11-318-LPS, 2014 WL 4365245, at *3 (D. Del. Sept. 3, 2014) (quoting *Alice*, 134 S. Ct. at 2358). The ’065 patent claims are therefore invalid under § 101.

B. The Asserted Claims Of The ’510 Patent Are Directed To Patent-Ineligible Subject Matter And Are Invalid Under § 101

Amdocs asserts claims 16, 17, and 19 of the ’510 patent. Claim 16, the only asserted independent claim, reads as follows:

> 16. A computer program product stored in a computer readable medium for reporting on a collection of network usage information from a plurality of network devices, comprising:

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computer code for collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers;

computer code for filtering and aggregating the network communications usage information;

computer code for completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;

computer code for storing the plurality of data records in a database;

computer code for submitting queries to the database utilizing predetermined reports for retrieving information on the collection of the network usage information from the network devices; and

computer code for outputting a report based on the queries;

wherein resource consumption queries are submitted to the database utilizing the reports for retrieving information on resource consumption in a network; and

wherein a resource consumption report is outputted based on the resource consumption queries.

Dependent claim 17 adds code to seek and obtain network usage reports, while dependent claim 19 adds code to generate an alert upon the occurrence of an event.

The abstract idea of the asserted claims of the '510 patent is the creation of a database of network usage information that can be queried to retrieve information on the collection of network usage information. Reports can be generated based on the queries and alerts can be set.

The asserted claims recite nothing more than a "computer program product" that computerizes and makes more efficient steps that could be performed with a pen and paper, a file cabinet, and a calculator. Indeed, the '510 patent concedes that the prior art included the use by phone companies of batch processed data relating to telephone use. '510 Patent, Col. 2:1-12. The '510 patent concedes that even in prior art processing telephone records "requires a significant amount of computing power" (*id*. at 2:12), therefore, "the computer implementation did not supply the necessary inventive concept." *Alice*, 134 S. Ct. at 2357. The '510 patent also

concedes that the claimed reports may be generated using "off-the-shelf graphical reporting packages" ('510 Patent, Col. 4:24-25) and that "[t]he system supports a non-proprietary database format" that "run[s] on any of a number of commercially available databases." *Id*. at 10:1-3.

Here, as in *Alice*, the claims are drawn to "a method of organizing human activity." *Alice*, 134 S. Ct. at 2356. Imagine that a telephone user's data is compiled by a human being after each call on a family's three cellular telephones. Each "data compilation" is put into a file cabinet. Each month the user's "data compilations" are taken from the file cabinet and a summation page is created and placed back into the user's file. These summation pages can later be reviewed to answer questions, make a "report," or see if an alert should be sent to the user.

The elements of the asserted claims of the '510 patent, considered individually or as an ordered combination, do nothing more than purport to limit this abstract idea to the particular technological environment of computer network usage, implemented on a generic computer via conventional computer code. '510 Patent, Col. 2:15-16 ("[W]hat is desired is a system that allows for accounting and billing of transactions on IP based networks."). That is far from what is required to transform the patent-ineligible abstract idea into a patent-eligible invention. *Alice*, 134 S. Ct. at 2358-59 ("the prohibition against patenting abstract ideas cannot be circumvented by attempting to limit the use of the idea to a particular technological environment").

The claim language belies any assertion that the claimed subject matter is patent-eligible because it enables the creation of a large database. Just as in *Planet Bingo*, the claims of the '510 patent require, at most, two network devices ("a plurality") and two so-called layers ("a plurality"). *See Planet Bingo, LLC v. VKGS LLC*, No. 2013–1663, 2014 WL 4195188, at *2 (Fed. Cir. August 26, 2014) (rejecting Planet Bingo's argument that their computer program could not be carried out manually because it handles thousands or millions of Bingo numbers,

and asserting that "[a]t most, the claims require 'two sets of Bingo numbers,' 'a player,' and 'a manager'"). The claim language thus falls far short of reciting an invention that necessarily handles thousands or millions of network usage information packages. *See id.*

In short, the '510 patent purports to claim nothing more than the use of generic computer power to make more efficient what could be done, and what has long since been done, by a human. The asserted claims are, therefore, invalid under § 101.

C. <u>The Asserted Claims Of The '984 Patent Are Directed To Patent-Ineligible Subject Matter And Are Invalid Under § 101</u>

The '984 patent is a sister to the '510 and '065 patents. Asserted independent method claim 1, which is representative of all asserted independent claims, reads as follows:

> 1. A method for reporting on the collection of network usage information from a plurality of network devices, comprising:
>
> (a) collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers utilizing multiple gatherers each including a plurality of information source modules each interfacing with one of the network devices and capable of communicating using a protocol specific to the network device coupled thereto, the network devices selected from the group consisting of routers, switches, firewalls, authentication servers, web hosts, proxy servers, netflow servers, databases, mail servers, RADIUS servers, and domain name servers, the gatherers being positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network;
>
> (b) filtering and aggregating the network communications usage information;
>
> (c) completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;
>
> (d) storing the plurality of data records in a database;
>
> (e) allowing the selection of one of a plurality of reports for reporting purposes;

(f) submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices; and

(g) outputting a report based on the queries.

Independent claim 13 recites a computer program product that does nothing more than execute the method of claim 1. Dependent claim 2 adds the submission of queries to the database using the reports; dependent claim 6 adds the generation of an alert; and dependent claim 8 adds an alert for the end of services.

Much like the ’510 patent, the abstract idea recited in the claims of the ’984 patent is the creation of a “queryable” database of network usage information. As discussed above, the creation of a database from various sources of information, and the ability to query that database and generate reports and alerts therefrom, is conventional and decades old.

The elements of the asserted claims of the ’984 patent add nothing more than generic and conventional computer hardware, regardless of whether they are considered one-at-a-time or holistically. The claim recites a litany of well-known “network devices,” none of which is performing anything other than its typical and ordinary function. The patent admits that “[t]he network devices represent *any devices* that could be included in a network.” ’984 Patent, Col. 4:49-50 (emphasis added). In this respect, the ’984 patent is merely the computerization of a process that could be performed by a human being in real time: (a) two “log files” from two “mail servers” (*see id.* at 4:59-60; Claim 1, Col. 15:43) are printed out (“gathered”) by a human operator immediately after each mail server’s session; (b) the information from the log files is “filtered” and “aggregated” by the operator; (c) the filtered/aggregated information is used to fill out paper data records; (d) the data records are placed in a filing cabinet; and (e) the operator can examine the records and make various reports that answer questions or allow the operator to generate an alert.

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Similarly, the ’984 patent concedes that in the prior art individual telephone usage records were captured, aggregated, and correlated through batch processing. *Id.* at 1:64-67. The ’984 patent purports to claim as a patent-eligible invention computerizing what telephone companies have long since done for their customers. *Id*. at 2:15-16. Yet, the ’984 patent requires no new hardware to accomplish this object, and offers no technological advance when these generic computer operations are performed on sources of network usage information rather than solely on telephone call records. To the contrary, the ’984 patent recites using the same “off-the-shelf” and “commercially available” computer hardware and software as the ’510 patent. *See id.* at 4:52-53, 9:37-39.

In sum, the claims of the ’984 patent do nothing more than “simply instruct the practitioner to implement the abstract idea of” building a database of network usage information “on a generic computer.” *Alice*, 134 S. Ct. at 2359. The functions performed by the computer as ordered by each specified method element are basic functions of a computer. Nothing patent-eligible is added; the ’984 patent is invalid under 35 U.S.C. § 101.

D. <u>The Asserted Claims Of The ’797 Patent Are Directed To Patent-Ineligible Subject Matter And Are Invalid Under § 101</u>

The ’797 patent is a “continuation-in-part” sister to the ’065, ’984, and ’510 patents. Amdocs asserts claims 1, 2, 7, 8, and 19. Corrected independent claim 1, which is representative of the asserted claims, reads as follows:

> 1. A method for generating a single record reflecting multiple services for accounting purposes, comprising:
>
> (a) identifying a plurality of services carried out over a network;
>
> (b) collecting data describing the plurality of services; and
>
> (c) generating a single record including the collected data, wherein the single record represents each of the plurality of services;

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> wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;
>
> wherein the data is collected utilizing an enhancement procedure defined utilizing a graphical user interface by:
>
> listing a plurality of available functions to be applied in real-time prior to end-user reporting,
>
> allowing a user to choose at least one of a plurality of fields, and
>
> allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.

The "graphical user interface" ("GUI") limitations appear in all claims, having been added by a certificate of correction. Claim 2 depends from claim 1 and further specifies sending the single record to a "Business Support System." Independent claim 7 is directed to the computer code that implements the method of claim 1; dependent claim 8 mirrors dependent claim 2. Independent method claim 19 likewise tracks claim 1.

The abstract idea of the '797 patent is the creation of a single record for accounting purposes from information collected from two of the specified services. The creation of one record from two information sources, however, is an abstract concept for organizing human activity. Indeed, such simplification is a "fundamental economic practice" and a patent-ineligible abstract idea. *See id.* at 2356; *Bilski*, 130 S. Ct. 3231.

The recitation of a GUI to select the data fields to be processed cannot save the claims. As explained below, other courts have already found that a GUI is simply the ubiquitous way one visually interacts with a computer using windows, icons, and menus. A GUI is the interface between a user and a computer that involves, for example, the use of a mouse-controlled computer screen cursor to select options from menus, or start programs by clicking icons. In

short, a GUI has been the standard, conventional, generic way to operate a personal computer for decades.

For example, the inclusion of a "User Interface" in the patent-ineligible claims in *DietGoal* was unavailing. *See DietGoal Innovations, LLC v. Bravo Media, LLC*, No. 13 Civ. 8391 (PAE), 2014 WL 3582914, at *41-45 (S.D.N.Y July 8, 2014) ("The addition of a computer to perform calculations, retrieve data, and ***visually display images*** is nothing more than 'post-solution activity; that cannot render the process patentable.") (emphasis added).

Likewise, the use of a GUI in the claims in *Loyalty Conversion* did not render those claims patent-eligible. *Loyalty Conversion Sys. Corp. v. Am. Airlines, Inc.*, No. 2:13-cv-655, 2014 WL 4364848, at *9 (E.D. Tex. Sept. 2, 2014). Judge Bryson's cogent explanation why the *Loyalty Conversion* "GUI claims" were invalid under § 101 applies with equal force to the asserted claims of the '797 patent:

> The role of the computer in the claims of the '023 and '550 patents is limited to the basic functions of a generic computer, including storing and displaying information, performing simple arithmetic calculations, and enabling a customer to make e-commerce purchases from a vendor. Nothing in the claims purports to improve the functioning of the computer itself, and the computer components of the claims add nothing that is not already present in the steps of the claimed methods, other than the speed and convenience of basic computer functions such as calculation, communication, and the display of information.

Id.

Here, the role of the computer in the asserted claims of the '797 patent is limited to the basic functions of a generic computer, including storing and displaying information, performing arithmetic calculations, and enabling a user to use a GUI in conventional fashion to choose functions and fields from a menu. The '797 patent recites using convention software, "such as the Microsoft Windows NT or Windows Operating System (OS), the IBM OS/2 operating system, the MAC OS, or UNIX operating system." '797 Patent, Col. 3:43-45. Northing claimed

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by the patent improves the computer, and the use of the GUI adds nothing to the abstract idea other than the speed and convenience of basic, long-known computer functions. The asserted claims of the ’797 patent are thus invalid under § 101.

IV. CONCLUSION

For the foregoing reasons, Openet respectfully requests that the Court grant judgment on the pleadings in Openet’s favor and hold the asserted claims invalid as directed to unpatentable subject matter.

Dated: September 26, 2014

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on this 26th day of September, 2014, I caused the foregoing document to be served on the following counsel for Amdocs (Israel) Limited via the Court's CM/ECF system:

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IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff, v. OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation, Defendants.	**Case No. 1:10-cv-910 (LMB/TRJ)** JURY TRIAL DEMANDED

PLAINTIFF'S OPPOSITION TO DEFENDANTS' MOTION FOR JUDGMENT ON THE PLEADINGS

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OTHER AUTHORITIES

I. INTRODUCTION

As this Court and the Federal Circuit have both already recognized, the asserted patents are directed to concrete improvements to a specific, highly complex technology. The patents claim methods and systems in which "raw usage logs for [network] services . . . are generated by several different network devices that may exist in different network levels. The patented system collects these raw usage data records from their diffuse locations throughout the network and through appropriate filtering, aggregation, correlation, and enhancement transforms them into a format suitable for accounting, called 'detail records' ('DRs')." *Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, 761 F.3d 1329, 1331-32 (Fed. Cir. 2014) (quoting Mem. Op., Dkt. No. 259 at 6). Under this Court's claim construction of "enhance" and "completing"—which the Federal Circuit affirmed—the claims further require that this enhancement take place "***in a distributed fashion***," or "close to the source of the network usage information." *See* Dkt. No. 259 at 48-49, 58 (emphasis added); *see also Amdocs*, 761 F.3d at 1340.

With the apparent desire to further delay trial of Amdocs' infringement claims, however, Openet ignores these prior decisions and the patents, asserting, for the second time, that the patents claim nothing more than an "abstract concept." Using Federal Rule of Civil Procedure 12(c), Openet now seeks to re-litigate its own prior Rule 56(a) summary judgment motion that the Court denied. Openet couples this request with a request that all further activity in this case be postponed in the meantime. *See* Joint Proposed Pre-Trial Plan, Dkt. No. 296 at 6-7.

Openet's motion should be denied for both procedural and substantive reasons. Procedurally, the arguments Openet now makes are barred by the law of the case doctrine. The identical arguments were briefed by the parties and rejected by this Court over two years ago. Openet has not met—and cannot meet—its burden to show that the Supreme Court's *Alice*

decision contradicts or significantly changes the law as applied to the already-rejected arguments Openet now seeks to re-raise.

Substantively, Openet's argument lacks merit. At base, Openet's argument amounts to a broad and unsupportable contention that any patent claiming an invention implemented by software is invalid (or at least presumptively invalid) after the U.S. Supreme Court's decision in *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014). *See, e.g.*, Defs' Mem. in Support of Their Mot. for J. on the Pleadings ("Openet Mem."), Dkt. No. 294 at 1, 6. But the *Alice* Court itself made clear that "[t]here is no dispute that a computer is a tangible system (in § 101 terms, a 'machine'), or that many computer-implemented claims are formally addressed to patent-eligible subject matter." *Alice*, 134 S. Ct. at 2358-59. Following *Alice,* the U.S. Patent and Trademark Office ("PTO") has likewise rejected the argument Openet now makes. *See* Ex. A, PTO Memorandum, *Preliminary Examination Instructions in view of the Supreme Court Decision in Alice Corporation Pty. Ltd. v. CLS Bank International, et al*. (June 25, 2014) ("PTO Memorandum") at 1 ("Notably, *Alice Corp.* neither creates a *per se* excluded category of subject matter, such as software or business methods, nor imposes any special requirements for eligibility of software or business methods.").

Far from an "abstract idea," the claims of the asserted patents are directed to collecting "raw usage" information from diffuse sources on a packet-based system such as the Internet, and using the collected information to build better network accounting records. Further, the claims set forth specific improvements to network accounting technology: among other things, they include limitations requiring computer code for: (i) collecting usage information from multiple sources in a multi-layered network system in real-time using multiple protocols; (ii) correlating often ephemeral data regarding network usage from multiple sources; (iii) enhancing network

accounting records utilizing a particular architecture, *i.e.*, in a "distributed fashion;" (iv) further transforming data by filtering and aggregating it; (v) generating reports regarding network usage information; and (vi) generating particular records that represent a plurality of packet-based services. *None* of these claim limitations is capable of being performed by a human alone. Ultimately, Openet has not come close to demonstrating by clear and convincing evidence that the claims cover patent ineligible "business methods," or methods of organizing human activity, or abstract principles fundamental to the ubiquitous use of the Internet or computers generally. The claims are not invalid under 35 U.S.C. § 101—this Court should deny Openet's motion.

II. BACKGROUND

A. Procedural History

In its April 29, 2011 Consent Scheduling and Final Pretrial Order (Dkt. No. 79), this Court ordered the parties to file summary judgment and *Markman* motions by May 26, 2011. On that date, Openet moved for summary judgment on the issues of infringement and invalidity. Dkt. Nos. 95-96. Openet asserted, among other things, that Claim 1 of U.S. Patent No. 7,631,065 ("'065 patent," attached as Ex. 1 to Openet Mem.), Claim 7 of U.S. Patent No. 6,836,797 ("'797 patent," attached as Ex. 4 to Openet Mem.), Claim 13 of U.S. Patent No. 6,947,984 ("'984 patent," attached as Ex. 3 to Openet Mem.), and Claim 16 of U.S. Patent No. 7,412,510 ("'510 patent," attached as Ex. 2 to Openet Mem.) "embrace non-patentable subject matter and are invalid under 35 U.S.C. § 101" because these "computer readable media claims are directed to an abstract idea." Dkt. No. 96 at 16-17 (*citing Bilski v. Kappos*, 130 S. Ct. 3218, 3230 (2010)).

On September 27, 2012, the Court denied Openet's summary judgment motion with respect to invalidity because of "material issues of fact in dispute." Order, Dkt. No. 248 at 1-2. The Court granted Openet's motion with respect to non-infringement, stating that its "ruling will

leave only the issue of patent invalidity for trial." *Id.* at 2. It directed the parties to advise the Court "whether they want to take the invalidity claims to trial." *Id.*

On January 22, 2013, the Court issued a supporting Memorandum Opinion, stating that "[a]lthough there remain disputed issues of material fact as to whether the patents-in-suit are invalid, the Court has determined upon further reflection that in light of its ruling" of no infringement, "the part of the Order issued on September 27, 2012, that gave defendants the option to pursue their invalidity claims will be vacated and the invalidity claims will be dismissed without prejudice." Dkt. No. 259 at 1-2. The Court further explained that its summary judgment ruling was based on the construction of three claim terms—"enhance" ('065 patent), "single record" ('797 patent), and "completing" ('984 and '510 patents).

Amdocs appealed the Court's ruling on the issues of infringement and claim construction. On August 1, 2014, the United States Court of Appeals for the Federal Circuit ("Federal Circuit") affirmed the Court's constructions of "enhance" and "completing," reversed the construction of "single record," and vacated summary judgment as to infringement. Dkt. No. 282. The mandate issued from the Federal Circuit on September 8, 2014. Dkt. No. 284.

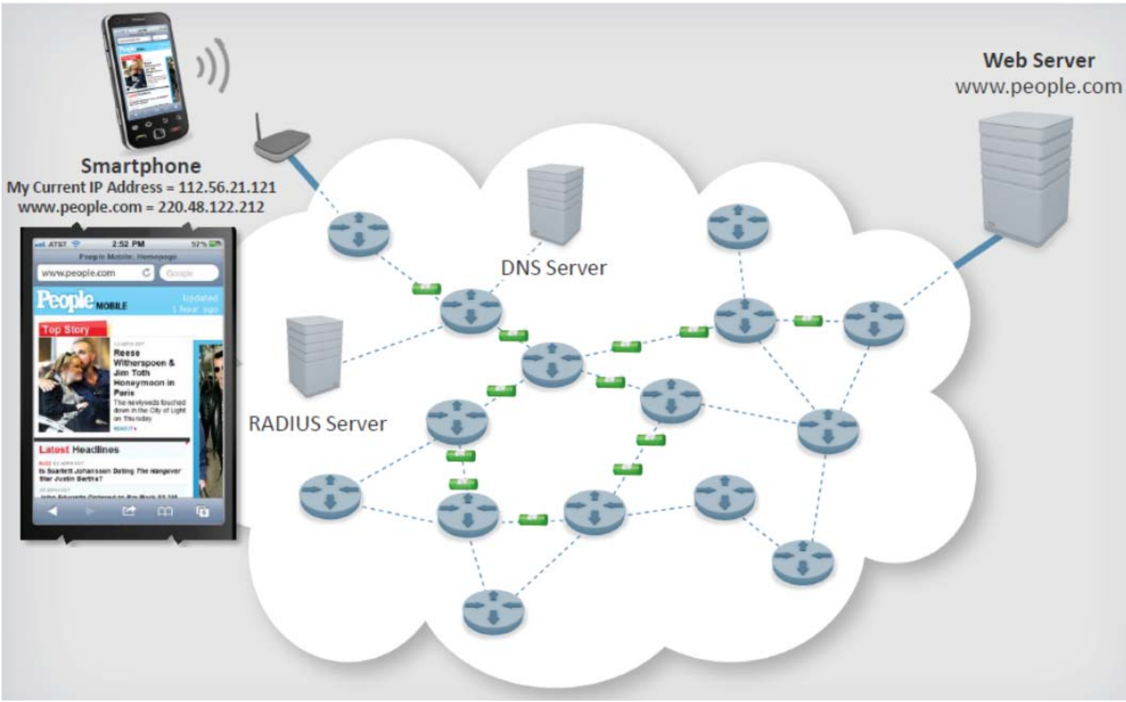
B. The Patented Inventions

1. The Problem in the Prior Art

Unlike traditional telephone systems, packet-based[1] computer networks, such as the Internet, are not designed to allow for easy record-keeping and monitoring of usage. As illustrated below, even during the transmission of a single web-page of information over the Internet, multiple packets of information (shown as green bars) travel along different paths

[1] A packet is "[a] short section of data of fixed length that is transmitted as a unit." Ex. B, McGraw-Hill Dictionary of Scientific and Technical Terms ("McGraw-Hill Technical Dictionary")) 1514 (6th ed. 2003); *see also* Declaration of Dr. Ellen W. Zegura, dated October 10, 2014 ("Zegura Decl.") ¶ 21).

between one point and another, making various stops along the way. Zegura Decl. ¶¶ 21-22. Only upon reaching their final destination are they then reassembled in the proper order. *Id.* ¶ 21.



Furthermore, unlike traditional circuit-switched telecommunications systems, where customers are assigned a fixed identifier (*i.e.*, a telephone number), Internet Protocol ("IP") addresses[2] assigned to Internet devices are often temporary, and may vary from one period of use to the next. *Id.* at ¶¶ 23-24. In other words, the "to" and "from" IP addresses that are used to "mail" packets are often temporarily assigned to one user, and then reassigned to a different user. *Id.* ¶ 24.

Moreover, as packets of data travel through the IP network, they encounter a variety of network devices, such as routers, authentication servers, Web hosts, domain name system ("DNS") servers, and others. *Id.* ¶¶ 25-26. Each such network device registers some

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[2] An IP address is a numeric address that identifies the location of a computer or device to the network. *See* Ex. B, MCGRAW-HILL TECHNICAL DICTIONARY at 1115. It does not represent any physical location; *see also* Zegura Decl. ¶ 23.

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information about the packet, but no single device registers enough information to enable creation of a record akin to a standard switch-based Call Detail Record. *Id.* ¶ 26. Further complicating the process, different network devices on the Internet operate using different languages, or protocols, resulting in difficulties with assimilating data collected from multiple sources. ’065 patent, 6:27-30; *see also* Zegura Decl. ¶ 26.

2. Amdocs’ Patented Solution

The inventors of Amdocs’ patents solved the problems associated with generating complete and accurate records for use of packet-based network services by inventing technology that enables ISPs to track each and every transaction and match information about each transaction to a particular user’s account. ’065 patent, 2:11-12. For example, where a customer accesses a particular webpage, the ISP can track information such as the user’s IP address, the duration of the session (*i.e.*, how long the user accessed the page), and the types of transactions that the user conducted during the session, such as downloading videos or images, using VoIP, sending email, etc.

Consistent with this purpose, the patents claim methods, systems, and computer program products that allow ISPs to create detailed and accurate usage-based accounting records, known as detail records (“DRs”), by capturing information from a packet-based network about each customer’s use of network services. *Id.* at 3:30-33. The software is configurable upon installation to permit the ISP to define what types of information it wishes to collect regarding transactions in the network. *Id.* at 9:7-10. The system then generates DRs for each user by collecting raw network usage data, such as IP addresses, number of packets transferred, etc., from network devices; correlating the collected data with the account of a particular user; and, where the collected information does not contain all the information needed for billing and/or accounting, enhancing the collected information to generate a complete record.

Further, as this Court concluded during claim construction, the asserted claims relate specifically to a "distributed 'hub and spoke' architecture" that has "associated efficiency gains" over other data collection and management systems that are centralized. Dkt. No. 259 at 25, 37. Whereas earlier systems "processed all of the network usage information at a single, central location," the patented system "minimizes network impact by collecting and processing data close to its source." *Id.* at 36 (quoting '984 patent, 3:33-34; '510 patent, 3:64-65; '065 patent, 3:62-63). The Court has already recognized that collecting and processing data close to its source has the tangible benefit of "'reducing the volume of data sent on the network to the CEM,' thereby 'eliminat[ing] capacity bottlenecks [and] improving the scalability and efficiency of the system.'" *Id.* (quoting '065 patent, 7:9-12; '510 patent, 7:9-12; '984 patent, 6:47-50). The Court emphasized that "[p]articularly because it is the feature that distinguishes the patented system from preexisting technology, the distributed processing of network records is a key component of the '065, '510, and '984 patents." *Id.* at 38. The Court of Appeals affirmed this claim construction. *Amdocs*, 761 F.3d at 2360.

III. ARGUMENT

A. Openet's Motion Is Barred by the Law of the Case

This Court previously denied Openet's motion for summary judgment of invalidity on the basis of 35 U.S.C. § 101. Openet now seeks not only to re-litigate this precise issue, but to do so ***with the identical arguments that it previously made***. The law of the case doctrine clearly precludes such a motion, except under "extraordinary circumstances" not present here. *Winston v. Pearson*, 683 F.3d 489, 498 (4th Cir. 2012) (internal quotation marks omitted) ("[W]e will not reconsider [a] previous holding absent extraordinary circumstances."); *United States v. Aramony*, 166 F.3d 655, 661 (4th Cir. 1999) ("([T]he doctrine [of the law of the case] posits that when a court decides upon a rule of law, that decision should continue to govern the same issues in

subsequent stages in the same case." (alteration in original)); *Coles v. Deltaville Boatyard, LLC*, No. 3:10cv491, 2011 WL 1750896 (E.D. Va. May 6, 2011) (rejecting defendant's summary judgment argument based upon court's prior legal conclusion on defendant's motion to dismiss, with regard to same issue); *see also Ford-Clifton v. Dep't of Veterans Affairs*, 661 F.3d 655, 659 (Fed. Cir. 2011) ("Under [the law of the case] doctrine, [i]ssues decided at an earlier stage of litigation, either explicitly or by necessary inference from the disposition, constitute the law of the case." (internal quotation marks omitted)); *Kori Corp. v. Wilco Marsh Buggies & Draglines, Inc.*, 761 F.2d 649, 657 (Fed. Cir. 1985) ("Issues decided at an earlier stage of litigation, either explicitly or by necessary inference from the disposition, constitute the law of the case" and courts should generally "refuse to reopen what has been decided." (citing 1 J. Moore, Federal Practice ¶ 0.404[1], n.15 (1984)) (internal quotation marks omitted)).

Under the law of the case doctrine, a prior decision should not be revisited by the Court, unless: "(1) a subsequent trial produces substantially different evidence, (2) controlling authority has since made ***a contrary decision of law*** applicable to the issue, or (3) the prior decision was clearly erroneous and would work manifest injustice." *Aramony*, 166 F.3d at 661 (emphasis added) (internal quotation marks omitted). While Openet argues that the Supreme Court's decision in *Alice*, 134 S. Ct. 2347, represented a "fundamental change in the law of § 101 patent eligibility" (Openet Mem. at 2), it has failed to point to a single way in which *Alice* altered prior law, much less any way in which *Alice* is a "contrary decision of law" with respect to the pre-2013 decisions that were in effect at the time Openet filed for summary judgment on the identical issue.

In fact, the *Alice* decision itself confirms that it was in line with existing precedent and did not represent a "contrary" change in the Supreme Court or the Federal Circuit's pre-existing

§ 101 jurisprudence. *See* 134 S. Ct. at 2350 (re-affirming *Bilski* and other prior decisions and concluding that "[i]t follows from our prior cases, and *Bilski* in particular, that the claims at issue here are directed to an abstract idea."). As the PTO has observed, after *Alice*, "the basic inquiries to determine subject matter eligibility ***remain the same***." Ex. A at 2 (PTO Memorandum) (emphasis added).

Indeed, the very precedents on which Openet relied in bringing its unsuccessful summary judgment motion were expressly re-affirmed in *Alice*. In its May 26, 2011 summary judgment brief, Openet made precisely the same § 101 invalidity arguments it makes now—and even ***cited*** the district court decision in *Alice* that the Supreme Court recently affirmed:

> Second, the computer readable media claims are directed to an abstract idea. *See Bilski v. Kappos*, 130 S. Ct. 3218, 3230 (2010). The claims do not "sufficient[ly] tie a process claim to a particular machine." *Cybersource Corp. v. Retail Decisions, Inc.*, 620 F. Supp.2d 1068, 1077 (N.D. Cal. 2009). As a practical matter, network accounting and usage information must be processed on a computer. ***The claims thus recite "an obvious mechanism for permitting a solution to be achieved more quickly, i.e., through the utilization of a computer for performing calculations." CLS Bank Int'l v. Alice Corp. Pty, Ltd., 2011 U.S. Dist. LEXIS 23669, *61 (D.D.C. Mar. 9, 2011)***. Likewise, the claims recite methods that "[o]n their face . . . simply obtain and compare intangible data" relating to the usage of telecommunications services without ever transforming the data. *Cybersource Corp. v. Retail Decisions, Inc.*, 620 F. Supp. 2d 1068, 1073 (N.D. Cal. 2009); *see also Glory Licensing LLC v. Toys 'R' Us, Inc.*, No. 09-4252, D.I. 55 at 8 (D.N.J. May 16, 2011) (invalidating patents that "claim processes involving the extraction of information entered into and stored in a document or file and the formatting and transmission of that information to an application program").

Dkt. No. 96 at 17 (emphasis added). In response to Openet's assertions, Amdocs argued, as it does again in this submission (*infra* at Section B), that "the inventions have 'specific application or improvement to technologies in the marketplace'—namely, computer networks (*quoting Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, 869 (Fed. Cir. 2010)), that "the authorities cited by Openet relate to patents claiming business methods that happened to employ a computer," unlike the patents here, where "a computer network is 'a machine and is integral to

each of the claims at issue,'" (quoting *SiRF Tech., Inc. v. lnt'l Trade Comm'n.*, 601 F.3d 1319, 1332 (Fed. Cir. 2010)), and that "the disputed claims require that the claimed software program *transform* records by 'enhancing' the data in the record." Dkt. No. 111 at 14 (emphasis in original).

Following three rounds of briefing and a hearing, the Court issued an order in which it found material issues of fact in dispute as to invalidity, such that its ruling would "leave only the issue of patent invalidity for trial." Dkt. No. 248 at 2. That ruling became the law of the case. *See id.* Openet's current motion is procedurally barred.

B. The Patents-In-Suit Are Directed to Patent-Eligible Subject Matter

Even if the law of the case doctrine were not dispositive of Openet's motion (it is), Openet's arguments are readily rejected on the merits. As explained in *Alice*, a patent claim is invalid as not directed to patent-eligible subject matter only if: (1) it is directed to an "abstract idea" rather than a tangible improvement to a specific technology, ***and*** (2) the limitations of the claim do not add "significantly more" than well-known, conventional features to that abstract idea. 134 S. Ct. at 2355.[3] Neither of these conditions is met by the asserted claims.[4] At a

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[3] As discussed in *Alice*, courts should first "determine whether the claims at issue are directed to one of those patent-ineligible concepts"—laws of nature, natural phenomena, or abstract ideas. *Alice*, 134 S. Ct. at 2355. If so, then courts must "consider the elements of each claim both individually and 'as an ordered combination' to determine whether the additional elements [in the claims] 'transform the nature of the claim' into a patent-eligible application," *i.e.*, courts must "search for an 'inventive concept' . . . to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself." *Id.*

[4] Nor do the claims of the asserted patents pose a pre-emption concern, as they are not directed to an abstract idea. *See Alice*, 134 S. Ct. at 2354 ("We have described the concern that drives this exclusionary principle as one of pre-emption. See, *e.g.*, *Bilski*, *supra*, at 611–612, 130 S.Ct. 3218 (upholding the patent 'would pre-empt use of this approach in all fields, and would effectively grant a monopoly over an abstract idea').") Indeed, the Court has construed the claims such that they do not monopolize even all types of "enhancement" of network accounting information, but rather only "distributed" enhancement, occurring "close to the source" of the network information.

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minimum, material factual disputes preclude judgment on the pleadings.

1. The Asserted Patents Are Not Directed to an Abstract Idea

The asserted patents do not claim an abstract concept. Instead, as already recognized by this Court and the Federal Circuit, they claim a specific technological improvement: the "transform[ation] . . . into a format suitable for accounting" of "raw usage data records" through "filtering, aggregation, correlation, and enhancement." *Amdocs*, 761 F.3d at 1331 (quoting Dkt. No. 259 at 6). Moreover, this Court's claim construction confirms that the claims are limited to a concrete improvement to specific technology: enhancement of raw network usage records "in a distributed fashion," *i.e.*, "close to the source of the network usage information." *See* Dkt. No. 259 at 48-49, 58; *see also Amdocs*, 761 F.3d at 1340; Zegura Decl. ¶¶ 34, 37, 46, 51, 60, 67, 76, 79, 94, 97, 110, 123, 134, 137, 146, 151, 161, 166. Indeed, the Court identified this limitation as a "key component" of the claims. Dkt. No. 259 at 38.

Openet's primary contention is that, post-*Alice*, courts have "repeatedly invalidated computerized data processing patents that are similar to Amdocs' asserted claims." Openet Mem. at 5. As explained more fully below, that is simply not the case. Since *Alice*, several courts have invalidated computerized ***business method*** patent claims; no court has invalidated patent claims under 35 U.S.C. § 101 that are directed to specific improvements to a particular technology similar to the claims of the asserted patents. Indeed, in the one post-*Alice* case where a court was asked to consider patent claims that are substantively similar to the asserted claims of Amdocs' patents, *Helios Software, LLC v. SpectorSoft Corp.*, No. 12-CV-081, 2014 WL 4796111 (D. Del. Sept. 18, 2014), the Court granted summary judgment that the patents ***were not invalid*** under § 101.

Helios Software involved patents "drawn to remotely monitoring data associated with an Internet session and controlling network access." *Id.* at *17. The court found that the claims

were not directed to "***fundamental truths or fundamental principles*** the patenting of which would pre-empt the use of basic tools of scientific and technological work," and that "***none of these limitations could be performed by a human alone***." *Id.* (emphasis added). Accordingly, it held that the patents were not "drawn to an abstract idea." *Id.* The court granted the Plaintiff's motion for summary judgment to dismiss the defendant's defense of lack of patentable subject matter. *Id.*

Here, as in *Helios Software*, the asserted claims are directed to methods, systems, and computer program products that "capture the content of an ongoing Internet communication session" in real time. *Id.*; *see also* Dkt. No. 259 at 36 ("[T]he patented system 'minimizes network impact by collecting and processing data close to its source.'" (quoting '984 patent, 3:33-34; '510 patent, 3:64-65; '065 patent, 3:62-63)). Indeed, "the distributed processing of network records is a ***key component*** of the '065, '510, and '984 patents." Dkt. No. 259 at 38 (emphasis added). As discussed above, the asserted claims cannot be performed by a human alone; rather the claimed devices "play a significant part in permitting the claimed method to be performed." *SiRF Tech.*, 601 F.3d at 1333; *see also, e.g.*, Zegura Decl. ¶¶ 44, 49, 58, 65, 70, 90, 108, 120, 126, 144, 149, 159, 164, 175. Thus, as in *Helios Software*, "[t]he invention[s] present[] functional and palpable applications in the field of computer technology," and are not directed to abstract ideas. *Research Corp. Techs.*, 627 F.3d at 868.

The cases cited by Openet are inapposite, because the claims in those cases were directed to computerized "business methods," rather than to tangible technological improvements to existing technology like the inventions in Amdocs' patents. For example, the patent at issue in *Bilski* claimed "the basic concept of hedging, or protecting against risk," which the Court determined was "a fundamental economic practice long prevalent in our system of commerce."

Bilski, 130 S. Ct. at 3231. Similarly, in *Alice*, the claims were "drawn to the concept of intermediated settlement, i.e., the use of a third party to mitigate settlement risk," which the Court found to be "a building block of the modern economy . . . beyond the scope of § 101." *Alice*, 134 S. Ct. at 2356. Indeed—and consistent with the cases cited in Openet's brief—post-*Alice*, the Federal Circuit has instructed that in determining "what type of matter the Court has held to come within the category of 'abstract idea,' … [t]he relevant Supreme Court cases are those which find an abstract idea in certain arrangements involving contractual relations," *i.e.*, methods of organizing human activity. *buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350, 2014 WL 4337771, at *3 (Fed. Cir. Sept. 3, 2014); *see also Planet Bingo, LLC v. VKGS LLC*, No. 2013-1663, 2014 WL 4195188, at *2 (Fed. Cir. Aug. 26, 2014) ("[M]anaging the game of bingo 'consists solely of mental steps which can be carried out by a ***human using pen and paper***.' . . . [N]ot only can these steps be 'carried out in existing computers long in use,' but they also can be '***done mentally***.'" (emphases added) (citations omitted)); *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1371 (Fed. Cir. 2011) ("[M]ethods which can be ***performed mentally***, or which are the equivalent of ***human mental work***, are unpatentable abstract ideas—the 'basic tools of scientific and technological work' that are open to all." (emphases added)). The district court cases on which Openet relies confirm that the abstract ideas excluded from section 101 are those that encompass basic human activity or mental processes.[5] *See* Openet Mem. at 5 n.3.

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[5] *See Comcast IP Holdings I, LLC v. Sprint Commc'ns Co. L.P.*, No. 12-CV-205, 2014 WL 3542055, at *4 (D. Del. July 16, 2014) ("A decision is a ***basic mental process*** upon which everyone relies. A decision may be performed, and generally is performed, entirely in the human mind. Such processes are 'unpatentable . . . because computational methods which can be ***performed entirely in the human mind*** are the types of methods that embody the basic tools of scientific and technological work that are free to all men and reserved exclusively to none.'" (emphases added) (quoting *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1373 (Fed. Cir. 2011))); *DietGoal Innovations LLC v. Bravo Media LLC*, No. 13-CV-8391, 2014 WL 3582914, at *10 (S.D.N.Y. July 8, 2014) ("Meal-planning is surely a 'long prevalent' practice. . .

The patents at issue here simply are not directed to such a manner of "organizing human activity" or a mental process, do not preempt use of the basic "building blocks of human ingenuity," and, thus, do not claim abstract ideas. *See Alice*, 134 S. Ct. at 2354. Indeed,

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. Although specific approaches to meal-planning have evolved as dietary knowledge has advanced and social mores have changed, ***humans*** have assuredly engaged at least in rudimentary meal-planning 'for millennia.' . . . [T]he claims of the '516 Patent recite steps that . . . could 'be ***performed in the human mind***, or by a ***human using a pen and paper***,' and 'a method that can be performed by human thought alone is merely an abstract idea and is not patent-eligible under § 101.'" (emphases added) (citations omitted)); *CMG Fin. Servs., Inc. v. American Airlines, Inc.*, No. 11-cv-10344, slip op. at 27 (C.D. Cal. Aug. 29, 2014) ("These claims merely recite basic, longstanding banking principles."); *Loyalty Conversion Sys. Corp. v. Am. Airlines, Inc.*, No. 2:13-CV-655, 2014 WL 4364848, at *10 (E.D. Tex. Sept. 3, 2014) ("[T]he basic functions of converting non-negotiable loyalty award credits of one vendor into loyalty award credits of a second vendor according to an agreed-upon conversion rate, and then allowing the consumer to use the converted loyalty award credits to make purchases from the second vendor, are all functions that are readily ***within the capacity of a human to perform*** without computer aid. Indeed, the patents themselves confirm that fact, conceding that 'the methods detailed herein can also be methods performed at least in part by a service agent and/or a machine manipulated by a service agent.'" (emphasis added)); *Walker Digital, LLC v. Google, Inc.*, No. 11-CV-318, 2014 WL 4365245, at *5 (D. Del. Sept. 3, 2014) ("[N]one of these limitations adds anything meaningful to the basic concept of controlled exchange of information about people as historically practiced by matchmakers and headhunters—and as disclosed in the patent specification itself. By contrast, all of these steps could be performed (and have been performed) by ***human beings interacting with one another***." (emphasis added)); *Tuxis Techs., LLC v. Amazon.com*, Inc., No. 13-CV-1771, 2014 WL 4382446, at *3 (D. Del. Sept. 3, 2014) ("[The asserted claims] simply deconstruct the abstract concept of cross-selling into a series of constituent and inherent steps according to which a ***customer*** makes contact with a ***merchant*** for the purpose of one purchase transaction, and the merchant offers a second purchase transaction. Tuxis agrees upselling is an abstract idea." (emphases added)); *Eclipse IP LLC v. McKinley Equip. Corp.*, No. 14-CV-154, 2014 WL 4407592, at *6 (C.D. Cal. Sept. 4, 2014) ("McKinley correctly points out that all of the recited steps in claim 1 can be performed by a ***person talking on the phone***." (emphasis added)); *Every Penny Counts, Inc. v. Wells Fargo Bank, N.A.*, No. 8:11-CV-2826, 2014 WL 4540319, at *4 (M.D. Fla. Sept. 11, 2014) ("[E]conomic actors of every description and every motive . . . have understood and exploited the elemental notion of regularly and frequently capturing a small and inconspicuous quantity and segregating and retaining the captured quantities until the quantities accumulate into a large quantity—a program indebted only and entirely to the fundaments of elemental arithmetic—***simple addition***." (emphasis added)); *Open Text S.A. v. Alfresco Software Ltd*, No. 13-CV-04843, 2014 WL 4684429, at *4 (N.D. Cal. Sept. 19, 2014) ("[The claims] recite a very simple computer-driven method to engage in the commonplace and time-honored practice of ***interacting with customers*** to promote marketing and sales. . . . This describes the most basic and widely-understood principle of marketing: identify potential or current customers and ***engage with them*** to improve their customer experience.").

Openet's argument that the claims are directed to an abstract idea fails for each of the asserted patents.

a) The '065 Patent

Claim 1 of the '065 patent[6] reads:

> 1. A computer program product embodied on a computer readable storage medium for processing network accounting information comprising:
>
> > computer code for receiving from a first source a first network accounting record;
> >
> > computer code for correlating the first network accounting record with accounting information available from a second source; and
> >
> > computer code for using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.

Openet identifies the "abstract idea of the '065 patent" to be "correlating and enhancing network usage data . . . to facilitate billing." Openet Mem. at 7. Even this overly simplistic summary of the claim, however, demonstrates that it is not subject to invalidation under 35 U.S.C. § 101. "Correlating and enhancing network usage data" is not a "fundamental economic practice," *Bilski*, 130 S. Ct. at 3231, or "method of organizing human activity," *Alice*, 134 S. Ct. at 2356. *See also Alice*, 134 S. Ct. at 2355 ("A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right." (quoting *Le Roy v. Tatham*, 55 U.S. 156, 175 (1852))).

Indeed, far from a "fundamental truth," the invention claimed in the '065 patent is directed to a specific improvement to packet-based network billing technology. *See* Zegura Decl. ¶¶ 37, 46, 51, 60, 67. As this Court explained, in the '065 patent, "[t]he patented system collects . . . raw usage data records from their diffuse locations throughout the network and through appropriate filtering, aggregation, correlation, and enhancement transforms them into a

[6] Amdocs also asserts infringement of claims 4, 7, 13, and 17 of the '065 patent. *See* Zegura Decl. ¶¶ 36-70.

format suitable for accounting, called 'detail records' ('DRs')." *Amdocs*, 761 F.3d at 1331-32 (quoting Dkt. No. 259 at 6).

What's more, under this Court's claim construction, the claims are further limited to the performance of that activity "in a distributed fashion" and "close to the source of the network usage information." *See* Dkt. No. 259 at 48-49, 58; *see also Amdocs*, 761 F.3d at 1340. Given that the claimed inventions collect "raw usage data records from their diffuse locations throughout the network" and must enhance those digital records "close to the source" of the network device where they are collected, "[w]e are not dealing with a situation in which there is a method that can be performed without a machine." *SiRF Tech.*, 601 F.3d at 1333; *see also* Zegura Decl. ¶¶ 39-43, 48, 53-57, 62-64, 69.[7]

b) The '984 and '510 Patents

Claim 1 of the '984 patent[8] reads:

> 1. A method for reporting on the collection of network usage information from a plurality of network devices, comprising:
>
> (a) collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers utilizing multiple gatherers each including a

[7] *Digitech Image Technologies, LLC v. Electronics for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014), relied on by Openet (Openet Mem. at 7-8), is not to the contrary. Despite Openet's contention that the method claim at issue in *Digitech Image* is "nearly identical" to claim 7 of the '065 patent (Openet Mem. at 7), *Digitech Image* is readily distinguishable. In that case, the court explained that while the method claim recited "a process of combining two data sets into a device profile," it failed to "claim the [image] processor's use of that profile in the capturing, transforming, or rendering of a digital image." *Id.* at 1351. Instead, "[t]he two data sets are generated by taking ***existing information*** . . . and organizing this information into a new form," and thus recited "an ineligible abstract process of gathering and combining data that ***does not require input from a physical device***." *Id.* (emphasis added). Contrary to the claims at issue in *Digitech Image*, each of the asserted claims here is specifically directed towards ***digital*** network accounting records, and further ties the collected and processed network accounting information to a physical device. *See, e.g.*, '065 patent, cl. 7 ("receiving from a ***first source*** a first network accounting record"); *see also* Zegura Decl. ¶¶ 39-41, 53-55, 62, 69.

[8] Amdocs also asserts infringement of claims 2, 7, 8, and 13 of the '984 patent. *See* Zegura Decl. ¶¶ 78-108.

plurality of information source modules each interfacing with one of the network devices and capable of communicating using a protocol specific to the network device coupled thereto, the network devices selected from the group consisting of routers, switches, firewalls, authentication servers, web hosts, proxy servers, netflow servers, databases, mail servers, RADIUS servers, and domain name servers, the gatherers being positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network;

(b) filtering and aggregating the network communications usage information;

(c) completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;

(d) storing the plurality of data records in a database;

(e) allowing the selection of one of a plurality of reports for reporting purposes;

(f) submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices; and

(g) outputting a report based on the queries.

Claim 16 of the ’510 patent[9] reads:

16. A computer program product stored in a computer readable medium for reporting on a collection of network usage information from a plurality of network devices, comprising:

> computer code for collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers;
>
> computer code for filtering and aggregating the network communications usage information;
>
> computer code for completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;
>
> computer code for storing the plurality of data records in a database;
>
> computer code for submitting queries to the database utilizing predetermined reports for retrieving information on the collection of the network usage information from the network devices; and
>
> computer code for outputting a report based on the queries;
>
> wherein resource consumption queries are submitted to the database utilizing the reports for retrieving information on resource consumption in a network; and
>
> wherein a resource consumption report is outputted based on the resource consumption queries.

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[9] Amdocs also asserts infringement of claims 17 and 19 of the ’510 patent. *See* Zegura Decl. ¶¶ 109-126.

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Openet contends that these claims are invalid under section 101 because the asserted claims of the ’510 patent allegedly “could be performed with a pen and paper, a file cabinet, and a calculator,” and the asserted claims of the ’984 patent allegedly “could be performed by a human in real time.” Openet Mem. at 11-12, 14. That is manifestly incorrect. A human being cannot collect “usage information in real-time from a plurality of network devices at a plurality of layers,” communicate with network devices “using a protocol specific to the network device,” “filter[] and aggregat[e]” network usage information, or complete data records “in a distributed fashion.” *See* Zegura Decl. ¶¶ 81-89, 99-107, 112-119, 125.

Moreover, Openet’s argument once again wholly ignores this Court’s claim construction, which also requires that “completion” include enhancement “close to the source” of multiple network information sources located at different locations. *See* Dkt. No. 259 at 48, 52-53, 117-118. Clearly, a human being cannot perform any activity “in a distributed fashion” as the Court’s claim construction (affirmed by the Federal Circuit) requires. *Id.* at 49; *see* Zegura Decl. ¶¶ 42-43, 48, 56-57, 63-64, 69, 87-88, 105-106, 117-118. Indeed, while the asserted patents describe “batch processing” as ***prior art*** (*see* ’065 patent, 2:2-10), in the claimed inventions, “network traffic information is ***captured at network information sources***” (*id.* at 2:34-35 (emphasis added)), and that data is then processed “close to its source” (*id.* at 3:63).[10] Thus, the elements of the asserted claims “play a significant part in permitting the claimed method to be performed, rather than function[ing] solely as an obvious mechanism for permitting a solution to be achieved more quickly.” *SiRF Tech.*, 601 F.3d at 1333; *see* Zegura Decl. ¶¶ 38-44, 47-49, 52-80-90, 98-108, 111-120, 124-126.

[10] Indeed, Openet’s purported example of “a telephone user’s data . . . compiled by a human being” not only fails to account for the claim language of the ’510 patent, but also relies on a prior art method and system that was ***expressly disparaged*** in the asserted patents. *See* ’065 patent, 1:61-2:11.

Because (i) the claimed data is collected and processed by a physical device, (ii) the claims cover enhancement of network accounting records in a packet-based network such as the Internet, and (iii) the enhancement must "occur[] close to the source of the network usage information" (Dkt. No. 259 at 48), none of these tasks can be performed by a human, and they instead "place[] a meaningful limit on the scope of the claims." 601 F.3d at 1332-33.

c) The '797 Patent

Finally, claim 1 of the '797 patent[11] (as corrected[12]) reads:

> 1. A method for generating a single record reflecting multiple services for accounting purposes, comprising:
>
> (a) identifying a plurality of services carried out over a network;
>
> (b) collecting data describing the plurality of services; and
>
> (c) generating a single record including the collected data, wherein the single record represents each of the plurality of services;
>
>> wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;
>>
>> wherein the data is collected utilizing an enhancement procedure defined utilizing a graphic user interface by:
>>
>>> listing a plurality of available functions to be applied in real-time prior to end-user reporting,
>>>
>>> allowing a user to choose at least one of a plurality of fields, and
>>>
>>> allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.

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[11] Amdocs also asserts infringement of claims 2, 7, 8, and 19 of the '797 patent. *See* Zegura Decl. ¶¶ 109-126.

[12] The PTO issued a Certificate of Correction of the '797 patent on June 22, 2010, which corrected independent claims 1 and 19 of the patent.

Openet contends that the ’797 patent is directed to the alleged “abstract idea” of “the creation of a single record for accounting purposes from information collected from two of the specified services.” Openet Mem. at 16. But, once again, even this overly simplified characterization of the claims demonstrates that they are not directed solely to an “abstract concept.” The “creation of a single record for accounting purposes” based on data received from a packet-based network is far from a “fundamental truth.” *See* Zegura Decl. ¶¶ 137, 146, 151, 161, 166. Instead, as with Amdocs’ other patents, the ’797 patent claims a specific technological improvement over prior art packet-based network billing records.

2. Even Were the Patents Directed to an Abstract Idea, the Additional Elements in the Claims Add “Significantly More” Than Conventional Steps

“[A]n invention is not rendered ineligible for patent simply because it involves an abstract concept.” *Alice*, 134 S. Ct. at 2354. Rather, “‘[a]pplication[s]’ of such concepts ‘to a new and useful end’ . . . remain eligible for patent protection.” *Id.* Thus, even where a patent claim is directed to an abstract concept (which the asserted patents are not), step two of the *Alice* framework requires courts to “examine the elements of the claim to determine whether it contains an ‘inventive concept’ sufficient to ‘transform’ the claimed abstract idea into a patent-eligible application.” *Id.* at 2357. In *Alice*, the focus under step two is on “whether the claims . . . do more than simply instruct the practitioner to implement the abstract idea … on a generic computer.” *Id.* at 2359.

Helios Software is again instructive regarding how to apply *Alice* and *Bilski* to computer software claims that are not directed towards business method patents (as *Alice* and *Bilski* both were). In *Helios Software,* the claims were “drawn to remotely monitoring data associated with an Internet session and controlling access,” and the court held that, “even if the asserted claims

were drawn to abstract ideas, the claims would remain patentable because they satisfy the machine-or-transformation test," reasoning:

> The implementation of the '304 Patent by a computer inserts ***meaningful limitations*** by claiming exchanging data over different internet sessions to capture the content of an ongoing Internet communication session. Similarly, the '571 Patent claims real-time data capture and transmission and reception, thereby using a computer to 'play a significant part in permitting the claimed method to be performed.' Finally, the '237 Patent involves the ability to provide access configurations and communication protocols that control computer network access and monitor activity. These meaningful limitations limit the scope of the patented invention and ***sufficiently tie the claimed method to a machine***. Importantly, both sides concede that ***none of these limitations could be performed by a human alone***. Accordingly, the Court finds that the patents-in-suit are not drawn to patent-ineligible subject matter.

2014 WL 4796111, at *17 (emphases added).

Openet argues that Amdocs's asserted claims do no more than "rearrang[e] data ***conventionally collected*** from a telecommunications network." *See* Openet Mem. at 2 (emphasis added). But, as in *Helios Software*, there is nothing conventional about the collection or processing of data in the claimed inventions. As this Court explained, the claimed system "is designed to execute specific pieces of [the] processing at specific stages," which "***distinguish[es] the invention from earlier systems.***" Dkt. No. 259 at 35-36 (emphasis added). Like the claims in *Diamond v. Diehr*, 450 U.S. 175 (1981), therefore, the claims here are "patent eligible because they ***improve[] an existing technological process***"—namely tracking and billing for network services in a packet-based network through the creation of better network accounting records. *Alice*, 134 S. Ct. at 2358 (emphasis added); *see also* Zegura Decl. ¶¶ 44, 49, 58, 65, 70, 90, 108, 120, 126, 144, 149, 159, 164, 175. Thus, unlike the claims at issue in *Alice* and the other cases cited by Openet, in Amdocs' patents, the "implementation of the [asserted claims] by a computer inserts meaningful limitations" by supplying an innovative manner of collecting, correlating,

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enhancing, and reporting on network accounting records in packet-based networks such as the Internet. *See Helios Software*, 2014 WL 4796111, at *17.

Contrary to Openet's contention that the asserted patents claim using "a generic computer to perform generic computer functions" (Openet Mem. at 2), each of the asserted claims transforms the components of a computer network into something they previously were not: a system capable of tracking network use. Thus, even if the Court were to (incorrectly) determine that the asserted claims are directed to an abstract concept, the additional limitations of the claims supply the necessary "inventive concept" to meet the threshold of section 101. Indeed, at a minimum, there are material issues of disputed fact as to whether the limitations of the claims other than the purported "abstract ideas" identified by Openet are merely conventional uses of a general purpose computer or add significantly more.

a) The '065 Patent

As Openet concedes, the asserted claims of the '065 patent are directed to "network accounting information" (Openet Mem. at 9) and, thus, are implemented within the technological environment of computer networks. However, unlike the patents at issue in *Bilski* and *Alice*, the asserted claims of the '065 patent (as well as the '510, '984, and '797 patents) ***do***, in fact, "improve the functioning of the computer itself," "effect an improvement in [a particular] technology or technical field," and thus "transform" any alleged "abstract idea into a patent-eligible invention." *Alice*, 134 S. Ct. at 2359-60; *see* Zegura Decl. ¶¶ 38-44, 47-49, 52-58, 61-65, 68-70.

As this Court has recognized (*see* Dkt. No. 259 at 24-25), the claimed inventions are designed to allow network service providers to "generate accurate usage-based billing" by "deriv[ing] IP session and transaction information, collected in real time, from a ***multitude of network elements***." '065 patent, 3:30-34 (emphasis added). To this end, the invention "is

designed to execute specific pieces of this processing at specific stages." Dkt. No. 259 at 35. In particular, the processing of network accounting information "occurs close to the source of the network usage information." *Id.* at 48. The claimed system is a ***specific improvement*** over prior art systems, which "processed all of the network usage information at a single, central location," as "collecting and processing data close to its source . . . 'reduc[es] the volume of data sent on the network to the CEM,' thereby 'eliminat[ing] capacity bottlenecks [and] improving the scalability and efficiency of the system.'" Dkt. No. 259 at 36; *see* Zegura Decl. ¶¶ 42-43, 48, 56-57, 63-64, 69. Thus, contrary to Openet's contentions, the asserted claims of the '065 patent do "effect an improvement in [a] technology or technical field." *See* Openet Mem. at 9.

Openet argues that "the asserted claims of the '065 patent require, at most, only conventional computer hardware and software." Openet Mem. at 9. However, there is nothing conventional about collecting and processing network accounting records at their source—indeed this Court held that doing so is a "key component" ***distinguishing*** the claimed invention from conventional systems. Dkt. No. 259 at 38; *see* Zegura Decl. ¶¶ 38-44, 47-49, 52-58, 61-65, 68-70. Moreover, the asserted claims of the '065 patent are not patentable solely "because they make efficient the generation of millions of [network accounting] records" (Openet Mem. at 9); rather the asserted claims are patentable, in part, due to the ***manner in which*** the claims facilitate the generation of network accounting records—*i.e.*, "in a distributed fashion." *See* Dkt. No. 259 at 49; *see also* Zegura Decl. ¶¶ 42-43, 48, 56-57, 63-64, 69. Thus, the claims here are akin to the claim at issue in *Diehr*, which the Supreme Court held was patentable "not because it involved a computer," but because it was "designed to solve a technological problem in 'conventional industry practice.'" *Alice*, 134 S. Ct. at 2358 (quoting 450 U.S. at 177-78). As in *Diehr*, the claims of the asserted patents are "patent eligible because they improve[] an existing

technological process"—accounting and billing for network usage in packet-based networks—and "not because they [are] implemented on a computer." *Id.*

Moreover, contrary to Openet's assertion, the patented invention is not one in which the computer merely enables the process to be performed more efficiently. *See* Openet Mem. at 9. Rather, here, the computer is "integral to the claimed invention, facilitating the process in a way that a person making calculations or computations could not." *Bancorp Servs., L.L.C. v. Sun Life Assur. Co. of Canada (U.S.)*, 687 F.3d 1266, 1278 (Fed. Cir. 2012) *cert. denied*, 134 S. Ct. 2870 (2014); *see also supra* at 11-15 (explaining that the claimed inventions cannot be performed by a human); Zegura Decl. ¶¶ 39-44, 48-49, 53-58, 62-65, 69-70. The receipt, correlation, and enhancement of network accounting records as claimed in the '065 patent "impose[s] a meaningful limit on the scope of a claim" by "play[ing] a significant part in permitting the claimed method to be performed." *SiRF Tech.*, 601 F.3d at 1333. Thus, the claims of the '065 patent "do more than simply instruct the practitioner to implement the abstract idea . . . on a generic computer." *Alice*, 134 S. Ct. at 2359.

b) The '984 and '510 Patents

As discussed above (*see supra* at 22-24), like the '065 patent, the manner in which network accounting records are collected, correlated, and enhanced also supplies an "inventive concept" to the inventions claimed in the '510 patent and '984 patents. *See* Zegura Decl. ¶¶ 81-89, 99-107, 112-119, 125. Moreover, both the '510 and '984 patents include additional elements which "ensure that the patent in practice amounts to significantly more than a patent upon the [alleged abstract idea] itself." *Alice*, 134 S. Ct. at 2355; *see* Zegura Decl. ¶¶ 81-89, 99-107, 112-119, 125. For example, the asserted claims of the '510 patent require, at a minimum, "collecting network communications usage information in ***real-time from a plurality of network devices*** at a plurality of layers"; "***filtering and aggregating*** the network communications usage information";

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and "completing a plurality of data records from the filtered and aggregated network communications usage information." *See, e.g.*, '510 patent, cl. 16 (emphases added); *see also* Zegura Decl. ¶¶ 81-82, 85-88, 99-100, 104-106, 112-119, 124-125. In addition to these limitations, the asserted claims of the '984 patent also require, at a minimum, "a ***plurality of information source modules*** each interfacing with one of the network devices and ***capable of communicating using a protocol specific to the network device***." *See, e.g.*, '984 patent, cl. 1 (emphases added); *see also* Zegura Decl. ¶¶ 82-84, 100-102, 113-114. These limitations add significantly more to any alleged abstract idea. *See, e.g.*, *AutoForm Eng'g GMBH v. Eng'g Tech. Assocs., Inc.*, No. 10-CV-14141, 2014 WL 4385855, at *3 (E.D. Mich. Sept. 5, 2014) ("While the patent may include or rely on some basic concepts in the design of sheet metal forming tools, the patents also include numerous limitations that narrow the scope of the patent."); *see also* Zegura Decl. ¶¶ 81-89, 99-107, 112-119, 125.

While Openet broadly contends that the asserted claims of the '510 and '984 patents are "implemented on a generic computer via conventional computer code," and "add nothing more than generic and conventional computer hardware" (Openet Mem. at 12, 14), Openet makes no attempt to show that these claim limitations—or any of the other numerous limitations—can be "implemented on 'a general-purpose digital computer.'" *Alice*, 134 S. Ct. at 2357. Openet points to the recitation of "network devices," stating that such devices are merely performing their "typical and ordinary function." *See* Openet Mem. at 14. But the "network devices" cited in the asserted claims are ***not*** performing their "typical and ordinary function[s]" at all. *See* Zegura Decl. ¶¶ 81-89, 99-107, 112-119, 125. Rather, unlike in the past, they are being used to collect and process network accounting information in "real time" and "close to the source" of that network accounting information. *See* Zegura Decl. ¶¶ 81-89, 99-107, 112-119, 125.

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Openet's isolated focus on "network devices" does nothing to demonstrate that the asserted claims are patent ineligible, as the Supreme Court has warned that courts should "consider the invention as a whole, rather than 'dissect[ing] the claims into old and new elements and then . . . ignor[ing] the presence of the old elements in the analysis.'" *Bilski*, 130 S. Ct. at 3230.

Thus, the asserted claims of the '510 and '984 patents recite specific devices that perform particular specialized functions—which cannot be performed by a human—in order to collect and report network usage information.[13] *See* Zegura Decl. ¶¶ 79-90, 97-108, 110-120, 123-126. "These meaningful limitations limit the scope of the patented invention and sufficiently tie the claimed method to a machine." *Helios Software*, 2014 WL 4796111, at *17.

c) The '797 Patent

Finally, citing *DietGoal Innovations LLC v. Bravo Media LLC*, No. 13-CV-8391, 2014 WL 3582914 (S.D.N.Y. July 8, 2014), and *Loyalty Conversion Sys. Corp. v. Am. Airlines, Inc.*, No. 2:13-CV-655, 2014 WL 4364848 (E.D. Tex. Sept. 3, 2014), Openet also asserts that "the

[13] The claims at issue here amount to much more than "a mere instruction to 'implemen[t]' an abstract idea 'on . . . a computer.'" *Alice*, 134 S. Ct. at 2358. Unlike the claims in *Bilski* and *Alice*, the claims of the '510 and '984 patents do more than recite generic computer functions in functional terms. *See Alice*, 134 S. Ct. at 2352 n.2 (reciting the claims as including the steps of "creating a shadow credit record," "obtaining . . . a start-of-day balance," "adjusting each respective party's shadow credit record," and "instructing on[e] of the exchange institutions"); *Bilski*, 130 S. Ct. at 3223-24 (reciting the claims as including the basic steps of "initiating a series of transactions," "identifying market participants," and "initiating a series of transactions"); *see also buySAFE*, 2014 WL 4337771, at *5 ("The computer functionality is generic—indeed, quite limited: a computer receives a request for a guarantee and transmits an offer of guarantee in return. There is no further detail. That a computer receives and sends the information over a network—with no further specification—is not even arguably inventive."); *Planet Bingo*, 2014 WL 4195188, at *3 ("[T]he claims recite a program that is used for the generic functions of storing, retrieving, and verifying a chosen set of bingo numbers against a winning set of bingo numbers."). *Cf. Loyalty Conversion Sys. Corp. v. Am. Airlines, Inc.*, No. 2:13-CV-655, 2014 WL 4364848, at *13 (E.D. Tex. Sept. 3, 2014) ("[Business method] patents . . . simply describe a problem, announce purely functional steps that purport to solve the problem, and recite standard computer operations to perform some of those steps. . . . [B]ecause they describe the claimed methods in functional terms, they preempt any subsequent specific solutions to the problem at issue.").

’797 patent is limited to the basic functions of a generic computer, including storing and displaying information, performing arithmetic calculations, and enabling a user to use a GUI in conventional fashion.” Openet Mem. at 17. However, Openet ignores that, unlike the patents at issue in *DietGoal* and *Loyalty Conversion*, the ’797 patent expressly defines ***how*** data is collected. *See* ’797 patent, cl. 1 (“wherein the data is collected utilizing an enhancement procedure defined utilizing a graphical user interface”); *see also* Zegura Decl. ¶¶ 140-144, 148, 153-157, 163, 168-173. As discussed above (*see supra* at 21-24), there is nothing conventional about the way the claimed inventions collect and process data. *See* Zegura Decl. ¶¶ 138-144, 147-149, 152-159, 162-164, 167-175. Thus, the asserted claims of the ’797 patent “contain[] an ‘inventive concept’ sufficient to ‘transform’ the claimed abstract idea into a patent-eligible application.” *Alice*, 134 S. Ct. at 2357.

IV. CONCLUSION

For the foregoing reasons, Openet’s Motion for Judgment on the Pleadings That Amdocs’ Asserted Patent Claims Are Invalid Under 35 U.S.C § 101 should be denied.

Dated: October 10, 2014

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify on the 10th day of October, 2014, I will electronically file the foregoing with the Clerk of Court using the CM/ECF system, which will then send a notification of such filing (NEF) to the following:

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EXHIBIT B

McGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS

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into fixed ions and mobile counterions. { ˌī·ə·nəˈjen·ik ˌgrüp }

ionogram [ENG] A record produced by an ionosonde, that is, a graph of the virtual height of the ionosphere plotted against frequency. { īˈän·əˌgram }

ionography [ANALY CHEM] A type of electrochromatography involving migration of ions. { ˌī·əˈnäg·rə·fē }

ionomer [ORG CHEM] Polymer with covalent bonds between the elements of the chain, and ionic bonds between the chains. { īˈän·ə·mər }

ionomer resin [ORG CHEM] A polymer which has ethylene as the major component, but which contains both covalent and ionic bonds. { īˈän·ə·mər ˈrez·ən }

ionone [ORG CHEM] $C_{13}H_{20}O$ A colorless to light yellow liquid with a boiling point of 126–128°C at 12 mmHg (1600 pascals); soluble in alcohol, ether, and mineral oil; used in perfumery, flavoring, and vitamin A production. Also known as irisone. { ˈī·əˌnōn }

ionophone [ENG ACOUS] A high-frequency loudspeaker in which the audio-frequency signal modulates the radio-frequency supply to an arc maintained in a quartz tube, and the resulting modulated wave acts directly on ionized air to create sound waves. { īˈän·əˌfōn }

ionophore [BIOCHEM] Any of a class of compounds, generally cyclic, having the ability to carry ions across lipid barriers due to the property of cation selectivity; examples are valinomycin and nonactin. { īˈän·əˌfȯr }

ionosonde [ENG] A radar system for determining the vertical height at which the ionosphere reflects signals back to earth at various frequencies; a pulsed vertical beam is swept periodically through a frequency range from 0.5 to 20 megahertz, and the variation of echo return time with frequency is photographically recorded. { īˈän·əˌsänd }

ionosphere [GEOPHYS] That part of the earth's upper atmosphere which is sufficiently ionized by solar ultraviolet radiation so that the concentration of free electrons affects the propagation of radio waves; its base is at about 40 or 50 miles (70 or 80 kilometers) and it extends to an indefinite height. { īˈan·əˌsfir }

ionospheric disturbance [GEOPHYS] A temporal variation in electron concentration in the ionosphere that is caused by solar activity and that makes the heights of the ionosphere layers go beyond the normal limits for a location, date, and time of day. { ˌīˌän·əˈsfir·ik diˈstər·bəns }

ionospheric D scatter meteor burst [GEOPHYS] Phenomenon affecting ionospheric scatter communications resulting from the penetration of meteors through the D region of the ionospheric layer. { ˌīˌän·əˈsfir·ik ˈdē ˌskad·ər ˈmēd·ē·ər ˌbərst }

ionospheric error [COMMUN] Variation in the character of the ionospheric transmission path or paths used by the radio waves of electronic navigation systems which, if not compensated, will produce an error in the information generated by the system. { ˌīˌän·əˈsfir·ik ˈer·ər }

ionospheric propagation [COMMUN] Propagation of radio waves over long distances by reflection from the ionosphere, useful at frequencies up to about 25 megahertz. { ˌīˌän·əˈsfir·ik ˌpräp·əˈgā·shən }

ionospheric recorder [ELECTR] A radio device for determining the distribution of virtual height with frequency, and the critical frequencies of the various layers of the ionosphere. { ˌīˌän·əˈsfir·ik riˈkȯrd·ər }

ionospheric scatter [COMMUN] A form of scatter propagation in which radio waves are scattered by the lower E layer of the ionosphere to permit communication over distances from 600 to 1400 miles (1000 to 2250 kilometers) when using the frequency range of about 25 to 100 megahertz. { ˌīˌän·əˈsfir·ik ˈskad·ər }

ionospheric storm [GEOPHYS] A turbulence in the F region of the ionosphere, usually due to a sudden burst of radiation from the sun; it is accompanied by a decrease in the density of ionization and an increase in the virtual height of the region. { ˌīˌän·əˈsfir·ik ˈstȯrm }

ionospheric wave *See* sky wave. { ˌīˌän·əˈsfir·ik ˈwāv }

ion pair [NUCLEO] A positive ion and an equal-charge negative ion, usually an electron, that are produced by the action of radiation on a neutral atom or molecule. { ˈīˌän ˌper }

ion-permeable membrane [MATER] A film or sheet of a substance which is preferentially permeable to some species or types of ions. { ¦īˌän ¦pər·mē·ə·bəl ˈmemˌbrān }

ion potential *See* ionization potential. { ˈīˌän pəˌten·chəl }

ion probe *See* secondary ion mass spectrometer. { ˈīˌän ˌprōb }

ion propulsion [AERO ENG] Vehicular motion caused by reaction from the high-speed discharge of a beam of electrically charged minute particles, usually positive ions, that are accelerated in an electrostatic field and ejected behind the vehicle. { ˈīˌän prəˈpəl·shən }

ion pump [ELECTR] A vacuum pump in which gas molecules are first ionized by electrons that have been generated by a high voltage and are spiraling in a high-intensity magnetic field, and the molecules are then attracted to a cathode, or propelled by electrodes into an auxiliary pump or an ion trap. { ˈīˌän ˌpəmp }

ion retardation [CHEM ENG] Sorbent extraction of strong electrolytes with an anion-exchange resin in which a cationic monomer has been polymerized, or vice versa. { ˈīˌän ˌrē·tärˈdā·shən }

ion scattering spectroscopy [SPECT] A spectroscopic technique in which a low-energy (about 1000 electronvolts) beam of inert-gas ions in directed at a surface, and the energies and scattering angles of the scattered ions are used to identify surface atoms. Abbreviated ISS. { ¦īˌän ¦skad·ə·riŋ spekˈträs·kə·pē }

ion-selective field-effect transistor [ELECTR] A field-effect transistor whose gate electrode is sensitive to certain ions in an electrolyte, so that the gain of the transistor depends on the concentration of these ions. Abbreviated ISFET. { ˈīˌän siˌlek·tiv ˈfēld iˌfekt tranˈzis·tər }

ion-solid interaction [SOLID STATE] An atomic process that occurs as a result of the collision of energetic ions, atoms, or molecules with condensed matter. { ˈīˌän ¦säl·əd ˌin·tərˈak·shən }

ion source [ELECTR] A device in which gas ions are produced, focused, accelerated, and emitted as a narrow beam. Also known as ion gun; ionization source. { ˈīˌän ˌsȯrs }

ion spot [ELECTR] Of a cathode-ray tube screen, an area of localized deterioration of luminescence caused by bombardment with negative ions. Also known as ion burn. { ˈīˌän ˌspät }

iontophoresis [MED] A medical treatment used to drive positive or negative ions into a tissue, in which two electrodes are placed in contact with tissue, one of the electrodes being a pad of absorbent material soaked with a solution of the material to be administered, and a voltage is applied between the electrodes. { īˌän·tə·fəˈrē·səs }

ion trap [ELECTR] **1.** An arrangement whereby ions in the electron beam of a cathode-ray tube are prevented from bombarding the screen and producing an ion spot, usually employing a magnet to bend the electron beam so that it passes through the tiny aperture of the electron gun, while the heavier ions are less affected by the magnetic field and are trapped inside the gun. **2.** A metal electrode, usually of titanium, into which ions in an ion pump are absorbed. { ˈīˌän ˌtrap }

iophobia [PSYCH] An abnormal fear of poison. { ˌī·əˈfō·bē·ə }

Iospilidae [INV ZOO] A small family of pelagic polychaetes assigned to the Errantia. { ˌī·əˈspil·əˌdē }

Io torus [ASTRON] A doughnut-shaped region of dense plasma that orbits Jupiter at the radial distance of the satellite Io and results from ionization by solar ultraviolet radiation of gases emitted from Io in volcanic eruptions. { ¦īˌō ˈtȯr·əs }

Iowan glaciation [GEOL] The earliest substage of the Wisconsin glacial stage; occurred more than 30,000 years ago. { ˈī·ə·wən ˌglā·sēˈā·shən }

ioxynil [ORG CHEM] $C_7H_3I_2NO$ A colorless solid with a melting point of 212–213°C; used for postemergence control of seedling weeds in cereals and sports turf. { īˈäk·səˌnil }

ioxynil octanoate [ORG CHEM] $C_{15}H_{17}I_2NO_2$ A waxy solid with a melting point of 59–60°C; insoluble in water; used as an insecticide for cereals and sugarcane. { īˈäk·səˌnil ˌäk·təˈnō·ət }

IPA *See* International Phonetic Alphabet. { ¦īˈpēˈā }

IP address [COMPUT SCI] A computer's numeric address, such as 128.201.86.290, by which it can be located within a network. { ¦īˈpē əˌdres }

IPC *See* propham.

Pacific time [ASTRON] The time for a given time zone that is based on the 120th meridian and is the eighth zone west of Greenwich. Also known as Pacific Standard Time. { pə'sif·ik 'tīm }

Pacific-type continental margin [GEOL] A continental margin typified by that of the western Pacific where oceanic lithosphere descends beneath an adjacent continent and produces an intervening island arc system. { pə'sif·ik ˌtīp ˌkänt·ən'ent·əl 'mär·jən }

Pacinian corpuscle [NEUROSCI] An encapsulated lamellar sensory nerve ending that functions as a kinesthetic receptor. { pə'chin·ē·ən 'kȯr·pə·səl }

pack [COMPUT SCI] To reduce the amount of storage required to hold information by changing the method of encoding the data. [IND ENG] To provide protection for an article or group of articles against physical damage during shipment; packing is accomplished by placing articles in a shipping container, and blocking, bracing, and cushioning them when necessary, or by strapping the articles or containers on a pallet or skid. [MIN ENG] **1.** A pillar built in the waste area or roadside within a mine to support the mine roof; constructed from loose stones and dirt. **2.** Waste rock or timber used to support the roof or underground workings or used to fill excavations. Also known as fill. [OCEANOGR] *See* pack ice. [ORD] Part of a parachute assembly in which the canopy and shroud lines are folded and carried. Also known as pack assembly. { pak }

package [COMPUT SCI] A program that is written for a general and widely used application in such a way that its usefulness is not impaired by the problems of data or organization of a particular user. { pak·ij }

packaged circuit *See* rescap. { 'pak·ijd ¦sər·kət }

packaged magnetron [ELECTR] Integral structure comprising a magnetron, its magnetic circuit, and its output matching device. { 'pak·ijd 'mag·nəˌträn }

package freight [IND ENG] Freight shipped in lots insufficient to fill a complete car; billed by the unit instead of by the carload. { 'pak·ij ˌfrāt }

package power reactor [NUC PHYS] A small nuclear power plant designed to be crated in packages small enough for transportation to remote locations. { 'pak·ij 'pau̇·ər rēˌak·tər }

packaging [ELEC] The process of physically locating, connecting, and protecting devices or components. { 'pak·ə·jiŋ }

packaging density [ELECTR] The number of components per unit volume in a working system or subsystem. { 'pak·ə·jiŋ ˌden·səd·ē }

pack artillery [ORD] Artillery weapons designed for transport in sections by animals or delivery by parachute; the weapon and carriage are partially disassembled for transport and reassembled for firing from ground positions. { 'pak ar'til·ə·rē }

pack assembly *See* pack. { 'pak əˌsem·blē }

pack builder [MIN ENG] **1.** One who builds packs or pack walls. **2.** In anthracite and bituminous coal mining, one who fills worked-out rooms, from which coal has been mined, with rock, slate, or other waste to prevent caving of walls and roofs, or who builds rough walls and columns of loose stone, heavy boards, timber, or coal along haulageways and passageways and in rooms where coal is being mined to prevent caving of roof or walls during mining operations. Also known as packer; pillar man; timber packer; waller. { 'pak ˌbild·ər }

pack carburizing [MET] A method of surface hardening of steel in which parts are packed in a steel box with the carburizing compound and heated to elevated temperatures. { 'pak 'kär·bəˌrīz·iŋ }

packed bed [CHEM ENG] A fixed layer of small particles or objects arranged in a vessel to promote intimate contact between gases, vapors, liquids, solids, or various combinations thereof; used in catalysis, ion exchange, sand filtration, distillation, absorption, and mixing. { 'pakt 'bed }

packed decimal [COMPUT SCI] A means of representing two digits per character, to reduce space and increase transmission speed. { 'pakt 'des·məl }

packed file [COMPUT SCI] A file that has been encoded so that it takes up less space in storage. Also known as compressed file. { ¦pakt 'fīl }

packed tower [CHEM ENG] A fractionating or absorber tower filled with small objects (packing) to bring about intimate contact between rising fluid (vapor or liquid) and falling liquid. { 'pakt 'tau̇·ər }

packed tube [CHEM ENG] A pipe or tube filled with high-heat-capacity granular material; used to heat gases when tubes are externally heated. { 'pakt 'tüb }

packer [ENG] A device that is inserted into a hole being grouted to prevent return of the grout around the injection pipe. [MIN ENG] *See* pack builder. [PETRO ENG] *See* production packer. { 'pak·ər }

packer fluid [PETRO ENG] Fluid inserted in the annulus between the tubing and casing above a packer in order to reduce pressure differentials between the formation and the inside of the casing and across the packer. { 'pak·ər ˌflü·əd }

packer test [PETRO ENG] A pressure test of a sealed zone in a well. { 'pak·ər ˌtest }

packet [BIOL] A cluster of organisms in the form of a cube resulting from cell division in three planes. [COMMUN] A short section of data of fixed length that is transmitted as a unit. [PHYS] *See* wave packet. { 'pak·ət }

packet gland [INV ZOO] A cluster of gland cells opening through the epidermis of nemertines. { 'pak·ət ˌgland }

packet switching *See* packet transmission. { 'pak·ət ˌswich·iŋ }

packet transmission [COMMUN] Transmission of standardized packets of data over transmission lines rapidly by networks of high-speed switching computers that have the message packets stored in fast-access core memory. Also known as packet switching. { 'pak·ət tranzˌmish·ən }

pack hardening [MET] A process of heat treating in which the workpiece is packed in a metal box together with carbonaceous material; carbon penetration is proportional to the length of heating; after treatment the workpiece is reheated and quenched. { 'pak ˌhard·ən·iŋ }

pack ice [OCEANOGR] Any area of sea ice, except fast ice, composed of a heterogeneous mixture of ice of varying ages and sizes, and formed by the packing together of pieces of floating ice. Also known as ice canopy; ice pack; pack. { 'pak ˌīs }

packing [CRYSTAL] Arrangement of atoms or ions in a crystal lattice. [ENG] *See* stuffing. [ENG ACOUS] Excessive crowding of carbon particles in a carbon microphone, produced by excessive pressure or by fusion particles due to excessive current, and causing lowered resistance and sensitivity. [GEOL] The arrangement of solid particles in a sediment or in sedimentary rock. [GRAPHICS] Paper used as a layer under the image or impression cylinder in letterpress printing or under the plate or blanket in lithographic printing in order to produce suitable pressure. [MET] In powder metallurgy, a material in which compacts are embedded during presintering or sintering operations. { 'pak·iŋ }

packing density [COMPUT SCI] The amount of information per unit of storage medium, as characters per inch on tape, bits per inch or drum, or bits per square inch in photographic storage. [ELECTR] The number of devices or gates per unit area of an integrated circuit. [GEOL] A measure of the extent to which the grains of a sedimentary rock occupy the gross volume of the rock in contrast to the spaces between the grains; equal to the cumulative grain-intercept length along a traverse in a thin section. { 'pak·iŋ ˌden·səd·ē }

packing fraction [NUC PHYS] The quantity $(M - A)/A$, where M is the mass of an atom in atomic mass units and A is its atomic number. { 'pak·iŋ ˌfrak·shən }

packing house [FOOD ENG] **1.** A food processing plant generally requiring the use of refrigeration. **2.** A building in which livestock are slaughtered and processed, and the meat products and by-products are packed. { 'pak·iŋ ˌhau̇s }

packing house pitch [MATER] Dark-brown to black by-product residue from manufacturing soap and candle stock or from refining vegetable oils, refuse, or wool grease; soluble in naphtha and carbon disulfide; used to make paints, varnishes, and tar paper, and in marine caulking and waterproofing. Also known as fatty-acid pitch. { 'pak·iŋ ˌhau̇s ˌpich }

packing index [CRYSTAL] The volume of ion divided by the volume of the unit cell in a crystal. { 'pak·iŋ ˌinˌdeks }

packing proximity [GEOL] In a sedimentary rock, an estimate of the number of grains that are in contact with adjacent grains; equal to the total percentage of grain-to-grain contacts along a traverse measured on a thin section. { 'pak·iŋ präkˌsim·əd·ē }

packing radius [CRYSTAL] One-half the smallest approach distance of atoms or ions. { 'pak·iŋ ˌrād·ē·əs }

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation,

Plaintiff,

v.

OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation,

Defendants.

Case No. 1:10cv910 (LMB/TRJ)

DECLARATION OF DR. ELLEN W. ZEGURA

I, Ellen W. Zegura, declare as follows:

1. I have been retained as an expert in this case by Wilmer Cutler Pickering Hale and Dorr LLP on behalf of Plaintiff Amdocs (Israel) Ltd. ("Amdocs"). I expect to testify at trial regarding Amdocs' assertions that Openet infringes U.S. Patent Nos. 7,631,065 ("'065 patent"), 7,412,510 ("'510 patent"), 6,947,984 ("'984 patent"), and 6,836,797 ("'797 patent") (collectively, the "patents-in-suit") and that the patents-in-suit are not invalid.

I. QUALIFICATIONS AND EXPERIENCE

2. I am currently a Professor in the School of Computer Science, which is part of the College of Computing at Georgia Institute of Technology. I served as Chair of the School of Computer Science from 2007-2012. My areas of concentration include network design, algorithms and services for internetworking, peer-to-peer and overlay networks, mobile wireless networks and computing.

3. I have been working in the field of networking and network services for over 20 years. I am the author over 100 publications in the field of networking, and I have presented at over 20 conferences. I am a member of the Institute of Electrical and Electronics Engineers (IEEE) and the Association of Computing Machinery (ACM), and have served as co-chair on several program committees for both organizations.

4. I received a Bachelor of Science in Computer Science and a Bachelor of Science in Electrical Engineering from Washington University in St. Louis in 1987. I received a Master of Science in Computer Science in 1990 and a Doctorate in Computer Science in 1993, both from Washington University.

5. From 1993 to the present, I have been on the faculty of the College of Computing at the Georgia Institute of Technology. I served as Associate Dean of the College of Computing

from 2003 to 2007, Division Chair of Computing Science and Systems from 2005 to 2007, and School Chair of Computer Science from 2007 to 2012.

6. Over the course of my career, I have authored multiple articles relating to, among other subjects, active networking; network architecture; and wireless, mobile, and peer-to-peer networks. I also served on the Editorial Boards of the Journal of High Speed Networks from 1996 to 1999, and the IEEE/ACM Transactions on Networking journal from 1999 to 2002. From 2002 to 2004, I served as Editor-in-Chief of the IEEE/ACM Transactions on Networking journal.

7. I am an ACM Fellow and an IEEE Fellow. These distinctions are reserved for the top 1% of members and recognize outstanding accomplishments in fields of interest to these organizations, including computing and information technology. In addition, I was awarded the Defense Advanced Research Projects Agency (DARPA) Active Networks Coordination Award in 2000, the College of Computing Outstanding Junior Faculty Research Award in 1997, and the National Science Foundation CAREER Award in 1995.

8. I have studied and researched in the area of wide-area (Internet) networking services and wireless networking since 1993. My current research includes mobile wireless networking, cloud computing, mobile computing, and information and communications for development. I regularly teach courses on computer networks. In particular, I have taught about computer network architecture and network services since at least 1993.

9. My qualifications for forming the opinions set forth in this Declaration are listed in this section and in my *curriculum vitae*, attached as Appendix A. My *curriculum vitae* also includes a list of all of my publications and speaking engagements.

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II. UNDERSTANDING OF THE LAW

10. I am not an attorney. I have been informed about certain aspects of the law that are relevant to my analysis and opinions.

11. I have been informed and understand that laws of nature, abstract ideas, and natural phenomena are not patent eligible.

12. I have been informed and understand that an application of an abstract idea, such as a mathematical formula, may be patent eligible if the patent claims add significantly more than routine, conventional activity to the underlying concept.

13. I have been informed and understand that an important and useful clue to patent eligibility is whether a claim is tied to a particular machine or apparatus or transforms a particular article into a different state or thing, according to the so-called "machine-or-transformation test." I have been informed and understand that the machine-or-transformation test is not the only test for patent eligibility.

14. I have been informed and understand that the Court has construed the claim term "enhance" to mean "to apply a number of field enhancements in a distributed fashion" and the claim term "complete" to mean to "enhance a record until all required fields have been populated."

III. PERSON OF ORDINARY SKILL IN THE ART

15. I have reviewed and understand the specifications, claims, and file histories of the patents-in-suit. Based on my review of these materials, I believe that the relevant field for purposes of my analysis is the field of computer networks. As described above, I have extensive experience in the relevant field.

16. I have been informed and understand that factors that may be considered in determining the level of ordinary skill in the art include: (1) the educational level of the inventor,

(2) type of problems encountered in the art, (3) prior art solutions to these problems, (4) rapidity with which innovations are made, (5) sophistication of the technology, and (6) educational level of active workers in the field.

17. In my opinion, based on the materials and information I have reviewed, and on my experience in the technical areas relevant to the patents-in-suit at about the time of the inventions described and claimed in the patents-in-suit, the person of ordinary skill in the art would have a Bachelor's degree in Electrical Engineering, Computer Science, or a similar degree, with at least two years of experience in networking technology. Alternatively, a person of ordinary skill in the art may have more education, *e.g.*, a Masters degree, but less work experience. As described in more detail above, I was a person with at least ordinary skill in the art of the patents-in-suit as of their earliest filing dates in 1997 and 2000. I have considered certain issues from the perspective of a person of ordinary skill in the art.

IV. BACKGROUND TECHNOLOGY

18. The patents-in-suit relate generally to the field of computer networks. In particular, the patents relate to accounting and billing for services provided in a computer network. (*See, e.g.*, '065 patent, Abstract).

19. In the 1997 timeframe, Network Service Providers ("NSPs") or Internet Service Providers ("ISPs"), responsible for providing Internet access, were faced with the problem of accurately billing for usage of network services in packet-switched computer networks such as the Internet.

20. The problems that NSPs and ISPs faced in tracking network usage were far from trivial due to the wide variety of network resources that were available to users, the type of usage information they provided, the ephemeral nature of the connections, and the nature of communications over packet-switched networks.

21. In a packet-switched network, no fixed path is used for data transfer nor do users always have a fixed identifier that uniquely identifies them. Instead, each computer is assigned one or more Internet Protocol ("IP") addresses, and data is segmented into smaller units of data called "packets" and sent piecemeal over the network with the IP address of the original sender and the IP address of the final receiver. These data packets can be routed, combined, or fragmented, in the same or different paths, as required to get them to their eventual destination. On the receiving end, the process is reversed—the data is read from the packets and then re-assembled into the form of the original data.

22. When an IP packet is sent from a computer, it arrives at an IP router. The IP router is responsible for "routing" (or forwarding) the packet to the correct destination by looking up the next hop in the forwarding table. If the final destination has been reached, the packet will be temporarily stored until it can be combined with the other packets in the communication; if not, the packet will be sent to the next hop. The path that any given packet will follow might be different from other packets of the same communication if the routing and forwarding table have changed. The router may identify and forward a packet to a different hop, depending on factors such as traffic volume, link failures or restorations in the network, or other parameters.

23. Each computer must have an IP address before it can connect to the Internet. IP addresses have commonly consisted of four numbers, each in the range 0 to 255, and are commonly written in "dotted quad notation" that separates each number by periods, for example "64.17.143.84." One can think of an IP address as a phone number on the Internet. Just like it would be problematic to have two different houses with the same phone number, it would be

problematic to have two different machines that have the same IP address on the Internet because there would be no way to ensure proper communications. Thus, IP addresses should be unique.

24. However, unlike traditional circuit-switched telecommunications systems, where customers are assigned a fixed identifier (*i.e.*, a telephone number), not all computers have fixed IP addresses. Instead, in some cases, computers are assigned a temporary IP address from a pool of IP addresses available to a service provider. Thus, the assigned IP address may be different from one period of use to the next.

25. When one computer wants to communicate with another computer, it must know the destination IP address of the other computer. Most users do not know or memorize IP addresses. Instead, users typically use more human-friendly domain names, *e.g.*, www.amdocs.com. When addressing a web site like http://www.amdocs.com, the domain name is translated to an IP address by a Domain Name System (DNS) server. DNS servers are distributed all over the world and are connected to the Internet to provide this critical translation service. DNS servers are responsible for translating domain names into IP addresses. They handle this translation for web sites, email, FTP servers, database servers, or any machine with a domain name.

26. Different components of the network, such as routers, switches, firewalls, authentication servers, Web hosts, DNS servers, etc., track and store information regarding the data packets traversing the network. This information, however, is not always standardized. For example, a router could compile many bytes of statistical information for a single packet as it passes through the router, making it difficult to easily identify and discern usage for a particular user. In addition, these various network components often operate using different protocols, or

communication languages, that make collecting information stored by the various components difficult.

27. Moreover, packet-switched networks such as the Internet typically employ a layered concept of networking, which was developed to manage complexity and accommodate changes in technology. Layering is a way of sub-dividing a communications task into smaller parts, each with a defined functionality. A layer is a collection of functions that provide services to the layer above it and receive services from the layer below it. For example, a layer that provides end-to-end packet delivery provides that service to the layer above (which might, for example, add functionality to make end-to-end packet delivery reliable), and uses the layer below to accomplish its task (for example, using a link layer service that moves a packet from one router to the next). Each layer in the network is generally responsible for a different network function. Each layer typically passes information up and down to the next subsequent layer as data is processed. And importantly, each layer may contain information regarding usage that a service provider would need to track for billing purposes.

28. Thus, there are many moving parts in a typical Internet communication session. To summarize, IP addresses are statically or dynamically assigned (and may change over time), name-to-address translations must be performed, *e.g.*, by a DNS server, and the packets transmitted from/to a user to/from a destination may travel along different paths through the network due to the very nature of packet switching. Moreover, the information captured by network devices is too raw to provide useful information regarding usage on its own. The result is that it was very difficult to accurately track Internet usage so that users could be billed for such usage.

V. THE ’065 PATENT

29. The ’065 patent is entitled “System, Method and Computer Program Product for Merging Data in a Network-Based Filtering and Aggregating Platform.” I understand that the ’065 patent is a continuation of U.S. Patent Application No. 09/442,876, which later issued as U.S. Patent No. 6,418,467. The ’065 patent discloses a system that can access any network related information sources, such as traffic statistics provided by routers and switching hubs as well as application server access logs. (’065 patent, Col. 2:26-29.) The information can be used to create auditing, accounting, and billing reports. (’065 patent, Col. 2:29-31.)

30. Fig. 1, reproduced below, illustrates an embodiment of the ’065 patent invention. The various network devices (*e.g.*, proxy server 101, DNS server 102, firewall 103, etc.) represent any devices in an IP network such as the Internet. (’065 patent, Col. 4:56-57.) These network devices perform various functions, such as the proxy server 101 providing proxy service for a number of clients. (’065 patent, Col. 4:57-59.) Typically, the network devices keep logging and statistical information about their activity. (’065 patent, Col. 5:18-20.) A network information source can be, for example, the log file of a mail server, the logging facility of a firewall, a traffics statistics table available on a router, a database entry accessible through the Internet, an authentication server’s query interface, etc. (’065 patent, Col. 5:20-24.)

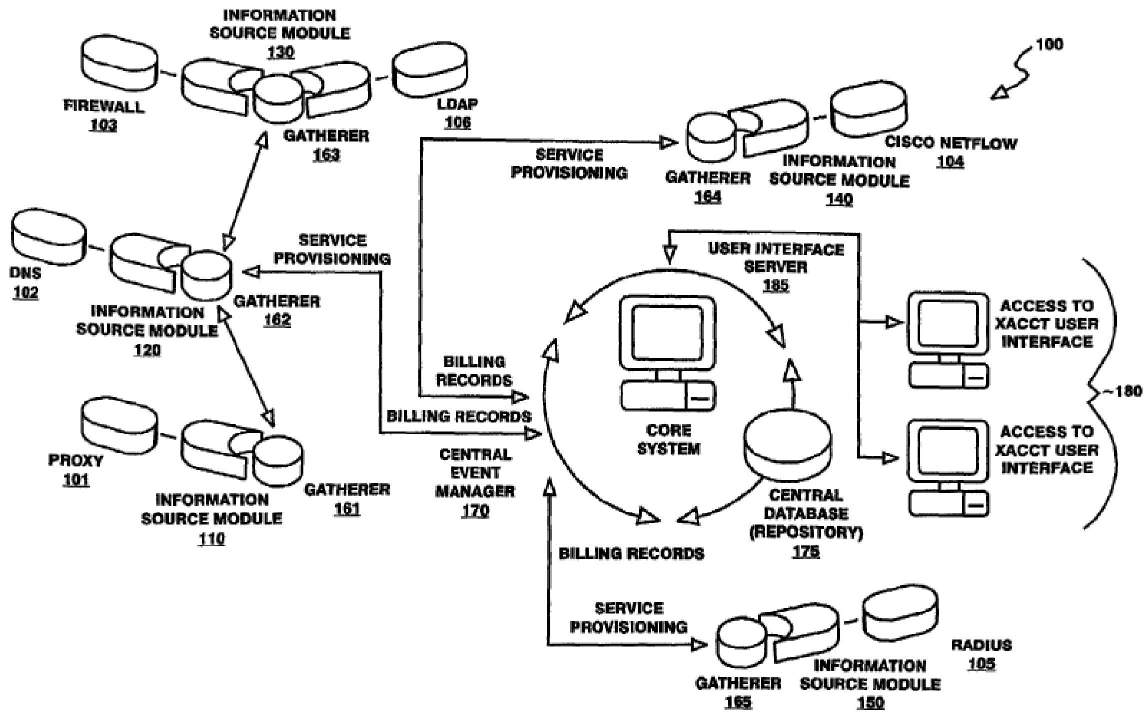

FIG. 1

31. In the example of Fig. 1, each network device is coupled to a corresponding Information Source Module ("ISM") and provides the information sources accessed by the ISMs. ('065 patent, Col. 5:24-26.) Each ISM is designed for a specific type of network data source. ('065 patent, Col. 5:32-33.) The ISMs act as interfaces or "translators" between the network devices and the gatherers, sending IP usage data, in real time, from the network devices to the gatherers. ('065 patent, Col. 5:32-38.) The gatherers collect network session data from one or more ISMs. ('065 patent, Col. 6:65-66.) Because the various types of ISMs provide different data in different formats, the gatherers normalize the data by extracting the fields needed for accounting and billing and filling in any fields that may be missing. ('065 patent, Col. 7:4-7.) Thus, the gatherers act as a distributed filtering and aggregation system. ('065 patent, Col. 7:7-8.) The distributed data filtering and aggregation eliminates capacity bottlenecks, improving the

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scalability and efficiency of the system by reducing the volume of data sent on the network. (’065 patent, Col. 7:8-12)

32. Typically, data collected from a single source does not contain all the information needed for billing and accounting, such as user name and IP address. (’065 patent, Col. 7:50-52.) In such cases, the data is enhanced. (’065 patent, Col. 7:52-53.) By combining IP session data from multiple sources, such as routers, firewalls, authentication servers, DNS servers, etc., the system creates meaningful session records tailored to the NSP’s specific requirements. (’065 patent, Col. 7:53-56.) In the example of Fig. 1, the gatherer 161 can provide information collected from the proxy server 101 to the gatherer 162 so that the source IP address for an Internet session collected from the proxy server 101 can be combined with the domain address collected from the DNS server 102. (’065 patent, Col. 7:56-61.)

33. I have been informed and understand that Openet contends claims of the ’065 patent are directed to the abstract idea of “correlating and enhancing network usage data … to facilitate billing.”

34. A person of ordinary skill in the art would understand that the claims of the ’065 patent are not directed to an abstract idea, but rather provide an innovative manner for tracking and accounting for network usage in packet-based networks such as the Internet. The claims of the ’065 patent are not directed to conventional or intangible concepts, but rather are directed to concrete systems and methods that offer an improvement in the field of computer networks.

35. A person of ordinary skill in the art would also understand that the specific elements of each of the ’065 patent claims add significantly more to any alleged abstract idea embodied in the claims of the ’065 patent, as described in more detail below.

A. Independent Claim 1

36. Independent claim 1 is a “computer program product” claim that reads:

> 1. A computer program product embodied on a computer readable storage medium for processing network accounting information comprising:
>
> computer code for receiving from a first source a first network accounting record;
>
> computer code for correlating the first network accounting record with accounting information available from a second source; and
>
> computer code for using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.

37. A person of ordinary skill in the art would understand that claim 1 is not directed to an abstract idea, but rather provides a specific manner for tracking, correlating, and enhancing network usage information from multiple sources in packet-based networks such as the Internet. Claim 1 is not directed to conventional or intangible concepts, but is directed to a concrete computer program product that offers an improvement in the technological field of computer networks. In particular, claim 1 improves the ability to account and bill for services provided in a computer network by providing a specific manner for collecting and enhancing raw network usage records "in a distributed fashion."

38. A person of ordinary skill in the art would also understand that the specific elements of claim 1 (*i.e.*, collecting network usage information from various sources, correlating and enhancing that information) add significantly more to any alleged abstract idea embodied by claim 1.

39. In particular, claim 1 recites computer code for collecting information from a first source, such as the log file of a mail server, the logging facility of a firewall, traffics statistics table available on a router, etc. The collection of network accounting records from network sources is not a conventional task that can be performed by a human being or by general purpose computer. Different network sources collect information in different formats and often at different layers of the network. ('065 patent, Col. 4:1-3; 7:4-5.) Thus, prior to the invention

claimed in the ’065 patent, there was no mechanism for collecting network usage information from the various network sources in a usable form.

40. Claim 1 also recites computer code for correlating the network accounting information collected from a first source with network accounting information available from a different source. Making such correlations can be difficult because the network accounting information collected from different sources is generally available in different formats and thus, must be normalized by extracting the fields needed for accounting and billing and filling in any fields that may be missing. (’065 patent, 7:4-7.)

41. The correlation of network accounting records obtained from different sources is not a conventional task that can be performed by a human being or by general purpose computer. Unlike traditional circuit-switched networks, where network usage could easily be tracked to a particular user because each user had a fixed identifier, *i.e.*, a telephone number, in packet-switched networks, such as those described in the ’065 patent, the information tracked by various network devices is not always standardized, is often provided in different formats, and is too raw to provide useful information regarding usage. (’065 patent, Col. 3:40-42; 7:4-5.) Thus, raw electronic usage information must be correlated in order to discern usage information for a particular user. Thus, such correlation cannot be done by a human being or by general purpose computer.

42. Claim 1 further recites that the network accounting record be “enhanced.” I have been informed and understand that “enhance” has been construed by the Court to mean “to apply a number of field enhancements in a distributed fashion.” I have also been informed and understand that the Court explained that “in a distributed fashion” means that network accounting records are collected and processed “close to the source of the network usage

information." In other words, data extracted from a particular network source is processed close to the network source where that data was collected. Distributed enhancement eliminates capacity bottlenecks, improving the scalability and efficiency of the system by reducing the volume of data sent on the network.

43. Distributed enhancement as described and claimed in the '065 patent cannot be performed by a human being or by a general purpose computer. In prior art circuit-switched networks, information about the connection was maintained by the network and did not need to be collected from individual network components. The circuit established between the calling party and the called party remains the same no matter how many intermediate devices are used to transmit the call. Thus there was no need to collect or process data close to its source. In packet-switched networks, such as those described in the '065 patent, raw usage data is collected from various sources and must be enhanced once collected to ensure all necessary information is obtained for billing and accounting. ('065 patent, Col. 3:40-42.) Thus, such enhancement of raw usage data cannot be done by a human being or by general purpose computer.

44. In summary, a person of ordinary skill in the art would understand that each of the elements of claim 1 of the '065 patent imposes structural limitations that play a significant role in permitting the claimed product to operate. These limitations cannot be performed by a human being or a general purpose computer, as they require collecting, correlating, and enhancing raw electronic records that are captured by different network devices and processed close to the source of the collected information. Thus, a person of ordinary skill in the art would understand that the elements of claim 1 add significantly more to any alleged abstract idea embodied in that claim.

B. Dependent Claim 4

45. Dependent claim 4 depends on claims 1, 2, and 3. Claim 2 recites that “the enhancement is based on a policy.” Claim 3 recites that “the accounting information includes parameters” and “adding at least one parameter from the accounting information to the first network accounting record.” Claim 4 recites that “the accounting information is in the form of a second network accounting record.”

46. For all of the reasons discussed above with respect to independent claim 1, a person of ordinary skill in the art would understand that claim 4 is not directed to an abstract idea, but rather provides an innovative manner for tracking, correlating, and enhancing network usage information from multiple network devices in packet-based networks such as the Internet. Similarly, for the same reasons discussed above for claim 1, claim 4 is not directed to conventional or intangible concepts, but is directed to a concrete method that offers an improvement in the technological field of computer networks.

47. For all of the reasons discussed above with respect to independent claim 1, a person of ordinary skill in the art would understand that the specific elements of claim 4 (*i.e.*, collecting network usage information from various sources, correlating and enhancing that information) add significantly more to any alleged abstract idea embodied by claim 4.

48. Moreover, claim 4 includes additional limitations that add additional structure to the claim. In particular, claim 4 requires policy-based enhancement according to particular parameters. Parameters are the variables in the fields of the records being received and processed by the computer code, such as a username. As explained above, information collected from network sources have different formats and are often collected at different layers of the network. (’065 patent, Col. 4:1-3; 7:4-5.) Claim 4 requires the raw network usage information tracked by various network devices to be broken down into a particular parameter. Such policy-

based enhancement of raw usage data cannot be done by a human being or by general purpose computer.

49. In summary, a person of ordinary skill in the art would understand that each of the elements of claim 4 of the ’065 patent imposes structural limitations that play a significant role in permitting the claimed product to operate. These limitations cannot be performed by a human being or a general purpose computer, as they require collecting, correlating, enhancing raw electronic records that are captured by different network devices and processed close to the source of the collected information, and organizing that information into network accounting records that contain particular parameters. Thus, a person of ordinary skill in the art would understand that the elements of claim 4 add significantly more to any alleged abstract idea embodied in that claim.

C. Independent Claim 7

50. Independent claim 7 is a method claim that reads:

7. A method of processing network accounting information comprising:

> receiving from a first source a first network accounting record;
>
> correlating the first network accounting record with accounting information available from a second source; and
>
> using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.

51. A person of ordinary skill in the art would understand that claim 7 is not directed to an abstract idea, but rather provides an innovative manner for tracking, correlating, and enhancing network usage information from multiple network devices in packet-based networks such as the Internet. Claim 7 is not directed to conventional or intangible concepts, but is directed to a concrete method that offers an improvement in the technological field of computer networks. In particular, claim 7 improves the ability to account and bill for services provided in

a computer network by providing a specific manner for collecting and enhancing raw network usage records "in a distributed fashion."

52. A person of ordinary skill in the art would understand that the specific elements of claim 7 (*i.e.*, collecting network usage information from various sources, correlating and enhancing that information) add significantly more to any alleged abstract idea embodied by claim 7.

53. In particular, claim 7 recites collecting information from a first source, such as the log file of a mail server, the logging facility of a firewall, traffics statistics table available on a router, etc. The collection of network accounting records from network sources is not a conventional task that can be performed by a human being or by general purpose computer. Different network sources collect information in different formats and often at different layers of the network. ('065 patent, Col. 4:1-3; 7:4-5.) Thus, prior to the invention claimed in the '065 patent, there was no mechanism for collecting network usage information from the various network sources in a usable form.

54. Claim 7 also recites correlating the network accounting information collected from a first source with network accounting information available from a different source. Making such correlations can be difficult because the network accounting information collected from different sources is generally available in different formats and thus, must be normalized by extracting the fields needed for accounting and billing and filling in any fields that may be missing. ('065 patent, Col. 7:4-7.)

55. The correlation of network accounting records obtained from different sources is not a conventional task that can be performed by a human being or by general purpose computer. Unlike traditional circuit-switched networks, where network usage could easily be tracked to a

particular user because each user had a fixed identifier, *i.e.*, a telephone number, in packet-switched networks, such as those described in the ’065 patent, the information tracked by various network sources is not always standardized, is often provided in different formats, and is too raw to provide useful information regarding usage. (’065 patent, Col. 3:40-42; 7:4-5.) Thus, raw electronic usage information must be correlated in order to discern usage information for a particular user. Thus, such correlation cannot be done by a human being or by general purpose computer.

56. Claim 7 further recites that the network accounting record be “enhanced.” I have been informed and understand that “enhance” has been construed by the Court to mean “to apply a number of field enhancements in a distributed fashion.” I have also been informed and understand that the Court explained that “in a distributed fashion” means that network accounting records are collected and processed “close to the source of the network usage information.” In other words, data extracted from a particular network source is processed close to the network source where that data was collected. Distributed enhancement eliminates capacity bottlenecks, improving the scalability and efficiency of the system by reducing the volume of data sent on the network.

57. Distributed enhancement as described and claimed in the ’065 patent cannot be performed by a human being or by a general purpose computer. In prior art circuit-switched networks, information about the connection was maintained by the network and did not need to be collected from individual network components. The circuit established between the calling party and the called party remains the same no matter how many intermediate devices are used to transmit the call. Thus there was no need to collect or process data close to its source. In packet-switched networks, such as those described in the ’065 patent, raw usage data is collected from

various sources and must be enhanced once collected to ensure all necessary information is obtained for billing and accounting. ('065 patent, Col. 3:40-42.) Thus, enhancement of raw usage data cannot be done by a human being or by general purpose computer.

58. In summary, a person of ordinary skill in the art would understand that each of the elements of claim 7 of the '065 patent imposes structural limitations that play a significant role in permitting the claimed method to be performed. These limitations cannot be performed by a human being or a general purpose computer, as they require collecting, correlating, and enhancing raw electronic records that are captured by different network devices and processed close to the source of the collected information. Thus, a person of ordinary skill in the art would understand that the elements of claim 7 add significantly more to any alleged abstract idea embodied in that claim.

D. Independent Claim 13

59. Independent claim 13 is a system claim reads:

> 13. A system for collecting data from network entities for a data consuming application, comprising:
>
> > a plurality of data collectors to receive information from the network entities and to produce records based on the information, each data collector in the plurality of data collectors being associated with and coupled to a different one of the network entities; and
> >
> > an enhancement component that augments data in one of the records produced by one of the plurality of data collectors with data from a different one of the records produced by another of the plurality of data collectors.

60. A person of ordinary skill in the art would understand that claim 13 is not directed to an abstract idea, but rather provides an innovative manner for collecting network usage information from various network entities and augmenting that data using an enhancement component in packet-based networks such as the Internet. Claim 13 is not directed to conventional or intangible concepts, but is directed to a concrete system that offers an

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improvement in the technological field of computer networks. In particular, claim 13 improves the ability to account and bill for services provided in a computer network by providing a specific manner for collecting and enhancing raw network usage records "in a distributed fashion."

61. A person of ordinary skill in the art would understand that the specific elements of claim 13 (*i.e.*, a plurality of data collectors receiving network usage information from various sources, coupling of collectors to network entities, and augmenting the information collected using an enhancement component) add significantly more to any alleged abstract idea embodied by claim 13.

62. In particular, claim 13 recites "a plurality of data collectors" configured to receive information from various network entities, such as routers, switches, firewalls, authentication servers, Web hosts, DNS servers, etc. Claim 13 further recites that each data collector is associated with and coupled to one of the network entities. The collection of network accounting records from network sources is not a conventional task that can be performed by a human being or by general purpose computer. Different network entities collect information in different formats and often at different layers of the network, and thus the recited data collectors would have been specialized components designed for the specific type of network entity to which they are coupled. ('065 patent, Col. 4:1-3; 5:32-33; 7:4-5.) The recited "data collectors" play a significant role in permitting the claimed system to function. Thus, prior to the invention claimed in the '065 patent, there was no mechanism for collecting network usage information from the various network sources in a usable form.

63. Claim 13 also recites an "enhancement component" to augment data collected by one data collector with data collected by another. I have been informed and understand that

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"enhance" has been construed by the Court to mean "to apply a number of field enhancements in a distributed fashion." I have also been informed and understand that the Court explained that "in a distributed fashion" means that network accounting records are collected and processed "close to the source of the network usage information." In other words, data extracted from a particular network source is processed close to the network source where that data was collected. Distributed enhancement eliminates capacity bottlenecks, improving the scalability and efficiency of the system by reducing the volume of data sent on the network.

64. Distributed enhancement as described and claimed in the '065 patent cannot be performed by a human being or by a general purpose computer. In prior art circuit-switched networks, information about the connection was maintained by the network and did not need to be collected from individual network components. The circuit established between the calling party and the called party remains the same no matter how many intermediate devices are used to transmit the call. Thus there was no need to collect or process data close to its source. In packet-switched networks, such as those described in the '065 patent, raw usage data is collected from various sources and must be enhanced once collected to ensure all necessary information is obtained for billing and accounting. ('065 patent, Col. 3:40-42.) Thus, such enhancement of raw usage data cannot be done by a human being or by general purpose computer.

65. In summary, a person of ordinary skill in the art would understand that each of the elements of claim 13 of the '065 patent imposes structural limitations that play a significant role in permitting the claimed system to function. These limitations cannot be performed by a human being or a general purpose computer, as they require collecting and enhancing raw electronic records that are captured by different network devices and processed close to the source of the

collected information. Thus, a person of ordinary skill in the art would understand that the elements of claim 13 add significantly more to any alleged abstract idea embodied in that claim.

E. Dependent Claim 17

66. Dependent claim 17 depends on claim 13, and recites "a module coupled to the plurality of data collectors, the module receives the records produced by the plurality of data collectors for aggregation purposes, and wherein the enhancement component resides in the module."

67. For all of the reasons discussed above with respect to independent claim 13, a person of ordinary skill in the art would understand that claim 17 is not directed to an abstract idea, but rather provides an innovative system for collecting network usage information from various network entities and augmenting that data using an enhancement component in packet-based networks such as the Internet. Similarly, for the same reasons as discussed above for claim 13, claim 13 is not directed to conventional or intangible concepts, but is directed to a concrete system that offers an improvement in the technological field of computer networks.

68. For all of the reasons discussed above with respect to independent claim 13, a person of ordinary skill in the art would understand that the specific elements of claim 17 (*i.e.*, a plurality of data collectors receiving network usage information from various sources, coupling of collectors to network entities, and augmenting the information collected using an enhancement component) add significantly more to any alleged abstract idea embodied by claim 17.

69. Moreover, claim 17 includes additional limitations that add additional structure to the claim. In particular, claim 17 recites a "module" containing the "enhancement component" that is "coupled to the plurality of data collectors," and which receives the network accounting records. Thus, claim 17 requires the raw network usage information tracked by various network

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devices to be received and enhanced by the same module. Such receipt and enhancement of raw usage data cannot be done by a human being or by general purpose computer.

70. In summary, a person of ordinary skill in the art would understand that each of the elements of claim 17 of the ’065 patent imposes structural limitations that play a significant role in permitting the claimed system to operate. These limitations cannot be performed by a human being or a general purpose computer, as they require collecting and enhancing raw electronic records that are captured by different network devices and processed close to the source of the collected information. Thus, a person of ordinary skill in the art would understand that the elements of claim 17 add significantly more to any alleged abstract idea embodied in that claim.

VI. THE ’984 AND ’510 PATENTS

71. The ’984 patent is entitled “System, Method and Computer Program Product for Reporting in a Network-Based Filtering and Aggregating Platform.”

72. The ’510 patent is entitled “System, Method and Computer Program Product for Reporting on the Collection of Network Usage Information.”

73. The ’984 patent, like the ’065 patent, is a continuation of U.S. Patent Application No. 09/442,876, which later issued as U.S. Patent No. 6,418,467. I understand that the ’510 patent is a continuation of the application that issued as the ’984 patent. As a result, I understand that the ’065, ’984, and ’510 patents share a common specification and drawings. Thus, my description of the ’065 patent above (*see supra* ¶¶ 29-32) applies equally to the ’984 and ’510 patents.

74. The common specification of the ’065, ’984, and ’510 patents also describes generation of reports of network usage, which is recited in the asserted claims of the ’984 and ’510 patents. In particular, the common specification describes monitoring network events, including network usage, as well as to providing “[c]ustomized reporting with built-in report

generation or an NSP's choice of off-the-shelf graphical reporting packages." ('984 patent, Col. 3:60-61). Specifically, the patents describe a User Interface Server (UIS) that allows multiple clients to access the system, and among other things create and run queries on information stored in database to generate reports on network activity and resource consumption. ('984 patent, Col. 9:58-60).

75. I have been informed and understand that Openet contends that the claims of the '984 patent are directed to the abstract idea of "the creation of a 'queryable' database of network usage information" and that the claims of the '510 patent are directed to the abstract idea of "the creation of a database of network usage information that can be queried to retrieve information on the collection of network usage information."

76. A person of ordinary skill in the art would understand that the claims of the '984 and '510 patents are not directed to abstract ideas, but rather provide an innovative mechanism for tracking, accounting for, and reporting on network usage in packet-based networks such as the Internet. The claim of the '984 and '510 patents are not directed to conventional or intangible concepts, but are directed to concrete systems and methods that offer an improvement in the field of computer networks.

77. A person of ordinary skill in the art would also understand that the specific elements of each of the claims add significantly more to any alleged abstract idea embodied in the '984 and '510 patents, as described in more detail below.

A. Independent Claim 1 of the '984 Patent

78. Independent claim 1 of the '984 patent is a method claim that reads:

> 1. A method for reporting on the collection of network usage information from a plurality of network devices, comprising:
>
> (a) collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers utilizing multiple gatherers each including a

plurality of information source modules each interfacing with one of the network devices and capable of communicating using a protocol specific to the network device coupled thereto, the network devices selected from the group consisting of routers, switches, firewalls, authentication servers, web hosts, proxy servers, netflow servers, databases, mail servers, RADIUS servers, and domain name servers, the gatherers being positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network;

(b) filtering and aggregating the network communications usage information;

(c) completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;

(d) storing the plurality of data records in a database;

(e) allowing the selection of one of a plurality of reports for reporting purposes;

(f) submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices; and

(g) outputting a report based on the queries.

79. A person of ordinary skill in the art would understand that claim 1 is not directed to an abstract idea, but rather provides an innovative manner for collecting, filtering, aggregating, enhancing, and completing network usage information from multiple network devices in packet-based networks such as the Internet. Claim 1 is not directed to conventional or intangible concepts, but is directed to a concrete method that offers an improvement in the technological field of computer networks. In particular, claim 1 improves the ability to account and bill for services provided in a computer network by providing a specific manner for collecting, filtering, aggregating, and reporting on raw network usage records "in a distributed fashion."

80. A person of ordinary skill in the art would also understand that the specific elements of claim 1 (*i.e.*, "a plurality of network devices at a plurality of layers," "gatherers,"

"information source modules," filtering and aggregating, completing, etc.) add significantly more to any alleged abstract idea embodied by claim 1.

81. In particular, claim 1 recites collecting network usage information from a plurality of network devices, such as routers, switches, firewalls, authentication servers, Web hosts, DNS servers, etc. Claim 1 further recites that this collection takes place at a plurality of layers in the network. In addition, claim 1 specifies the structure for how such collection is accomplished. In particular, "multiple gatherers" are coupled with "a plurality of information source modules," which each interface with a network device.

82. The collection of network accounting records from network sources is not a conventional task that can be performed by a human being or by general purpose computer. As embodied by the claim language, different network devices collect information in different formats, at different layers of the network, and thus the recited "gatherers" and "information source modules" would have been specialized devices designed for the specific type of network entity to which they are coupled. ('984 patent, Col. 3:39-41; 5:8-12; 6:42-43.) The recited "gatherers" and "information source modules" play a significant role in permitting the claimed method to be performed. Thus, prior to the invention claimed in the '984 patent, there was no mechanism for collecting network usage information from the various network sources in a usable form, as different network devices collect information in different formats, at different layers of the network. ('984 patent, Col. 3:39-41; 6:42-43.)

83. Claim 1 also recites that each information source module (ISM) is capable of communicating using a protocol, or communication language, specific to the network device to which it is coupled. As embodied by the claim language, different network devices collect information in different formats, at different layers of the network, and thus the recited

"information source modules" are specialized modules designed to communicate with the specific type of network devices to which they are coupled using a particular protocol. ('984 patent, Col. 3:39-41; 5:8-12; 6:42-43.) The recited "information source modules" play a significant role in permitting the claimed method to be performed. Thus, the communication of ISMs with network devices in a particular protocol is not a conventional task that can be performed by a human being or by general purpose computer, as it requires that the ISM be able to collect and interpret raw electronic communications transmitted from the network device.

84. Claim 1 also recites that the gatherers are "positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network," adding further structure to the claim. In addition, the claim recites that data is collected in "real-time," or in a manner which ensures no more than a fixed latency. The positioning of gatherers close to the network devices from which they collect is not a conventional task that can be performed by a human being or by general purpose computer, as network devices, such as routers, firewalls, DNS servers, etc., can be distributed all over the world and it would be impossible for human beings or a general purpose computer to collect data from such devices in real-time.

85. Claim 1 further recites "filtering and aggregating" the network usage information collected from the network devices. Filtering and aggregating network usage information can be difficult because the usage information collected from different sources is generally available in different formats and thus, must be normalized by extracting the fields needed for accounting and billing and filling in any fields that may be missing. ('984 patent, Col. 6:43-45.)

86. The filtering and aggregation of network usage information obtained from different network sources is not a conventional task that can be performed by a human being or

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by general purpose computer. Unlike traditional circuit-switched networks, where network usage could easily be tracked to a particular user because each user had a fixed identifier, *i.e.*, a telephone number, in packet-switched networks, such as those described in the ’984 patent, the information tracked by various network devices is not always standardized, is often provided in different formats, and is too raw to provide useful information regarding usage. (’984 patent, Col. 3:12-14; 6:41-42.) Thus, raw electronic usage information must be filtered and aggregated in order to discern usage information for a particular user. Such filtering and aggregation cannot be done by a human being or by general purpose computer.

87. Claim 1 further recites “completing” a plurality of data records, which correspond to network usage by a plurality of users. I have been informed and understand that “complete” has been construed to mean to “enhance a record until all required fields have been populated” and that the term “completing” incorporates the construction of “enhance” (“to apply a number of field enhancements in a distributed fashion”). I have also been informed and understand that the Court explained that “in a distributed fashion” means that network accounting records are collected and processed “close to the source of the network usage information.” In other words, data extracted from a particular network source is processed close to the network source where that data was collected. Distributed enhancement eliminates capacity bottlenecks, improving the scalability and efficiency of the system by reducing the volume of data sent on the network.

88. Distributed enhancement as described and claimed in the ’984 patent cannot be performed by a human being or by a general purpose computer. In prior art circuit-switched networks, information about the connection was maintained by the network and did not need to be collected from individual network components. The circuit established between the calling party and the called party remains the same no matter how many intermediate devices are used to

transmit the call. Thus there was no need to collect or process data close to its source. In packet-switched networks, such as those described in the '984 patent, raw usage data is collected from various sources and must be enhanced once collected to ensure all necessary information is obtained for billing and accounting. ('984 patent, Col. 3:12-14.) Such enhancement of raw usage data cannot be done by a human being or by general purpose computer.

89. Claim 1 also recites storing the collected, aggregated, filtered, and completed data records in a database, such that they can be used later to "retriev[e] information on the collection of the network usage information from the network devices" and "output[] a report." These limitations are directed to a particular application of using network usage records and play a significant role in permitting the claimed method to be performed.

90. In summary, a person of ordinary skill in the art would understand that each of the elements of claim 1 of the '984 patent imposes structural limitations that play a significant role in permitting the claimed method to be performed. These limitations cannot be performed by a human being or a general purpose computer, as they require collecting, aggregating, filtering, and enhancing raw electronic network records that are captured by different network devices, at different network layers, in different formats, and are processed close to the source of the collected information. Moreover, the claims recite a particular structure for how such records are collected and generated, *i.e.*, gatherers, including ISMs, are coupled to network devices, are located in the same network segment as the network devices to which they are couple, and are capable of communicating in the same protocol as the network device. Thus, a person of ordinary skill in the art would understand that the elements of claim 1 add significantly more to any alleged abstract idea embodied in that claim.

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B. Dependent Claims 2, 7, and 8 of the '984 Patent

91. Dependent claim 2 of the '984 patent depends on claim 1, and recites "submitting network activity queries to the database utilizing the selected reports for retrieving information on activity of the network."

92. Dependent claim 7 of the '984 patent depends on claims 2 and 6. Claim 6 recites "generating an alert upon the occurrence of an event." Claim 7 recites that "the alert is generated upon a value surpassing a predetermined amount."

93. Dependent claim 8 of the '984 patent depends on claim 6 and recites that "the alert indicates that services should be ceased."

94. For all of the reasons discussed above with respect to independent claim 1, a person of ordinary skill in the art would understand that claims 2, 7, and 8 are not directed to abstract ideas, but rather provide an innovative manner for collecting, filtering, aggregating, enhancing, and completing network usage information from multiple network devices in packet-based networks such as the Internet. Similarly, for the same reasons as discussed above for claim 1, claims 2, 7, and 8 are not directed to conventional or intangible concepts, but are directed to a concrete method that offers an improvement in the technological field of computer networks.

95. For all of the reasons discussed above with respect to independent claim 1, a person of ordinary skill in the art would understand that the specific elements of claims 2, 7, and 8 (*i.e.*, "a plurality of network devices at a plurality of layers," "gatherers," "information source modules," filtering and aggregating, completing, etc.) add significantly more to any alleged abstract idea embodied by those claims.

C. Independent Claim 13 of the '984 Patent

96. Independent claim 13 of the '984 patent is a "computer program product" claim that reads:

> 13. A computer program product embedded into computer readable medium for reporting on the collection of network usage information from a plurality of network devices, comprising:
>
> (a) computer code for collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers utilizing multiple gatherers each including a plurality of information source modules each interfacing with one of the network devices and capable of communicating using a protocol specific to the network device coupled thereto, the network devices selected from the group consisting of routers, switches, firewalls, authentication servers, web hosts, proxy servers, netflow servers, databases, mail servers, RADIUS servers, and domain name servers, the gatherers being positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network;
>
> (b) computer code for filtering and aggregating the network communications usage information;
>
> (c) computer code for completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;
>
> (d) computer code for storing the plurality of data records in a database;
>
> (e) computer code for allowing the selection of one of a plurality of reports for reporting purposes;
>
> (f) computer code for submitting queries to the database utilizing the selected reports for retrieving information on the collection of the network usage information from the network devices; and
>
> (g) computer code for outputting a report based on the queries.

97. A person of ordinary skill in the art would understand that claim 13 is not directed to an abstract idea, but rather provides an innovative manner for collecting, filtering, aggregating, enhancing, and completing network usage information from multiple network devices in packet-based networks such as the Internet. Claim 13 is not directed to conventional or intangible concepts, but is directed to a concrete computer program product that offers an

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improvement in the technological field of computer networks. In particular, claim 13 improves the ability to account and bill for services provided in a computer network by providing a specific manner for collecting, filtering, aggregating, and reporting on raw network usage records "in a distributed fashion."

98. A person of ordinary skill in the art would understand that the specific elements of claim 13 (*i.e.*, "a plurality of network devices at a plurality of layers," "gatherers," "information source modules," filtering and aggregating, completing, etc.) add significantly more to any alleged abstract idea embodied by claim 13.

99. In particular, claim 13 recites computer code for collecting network usage information from a plurality of network devices, such as routers, switches, firewalls, authentication servers, Web hosts, DNS servers, etc. Claim 13 further recites that this collection takes place at a plurality of layers in the network. In addition, claim 13 specifies the structure for how such collection is accomplished. In particular, "multiple gatherers" are coupled with "a plurality of information source modules," which each interface with a network device.

100. The collection of network accounting records from network sources is not a conventional task that can be performed by a human being or by general purpose computer. As embodied by the claim language, different network devices collect information in different formats, at different layers of the network, and thus the recited "gatherers" and "information source modules" would have been specialized devices designed for the specific type of network entity to which they are coupled. ('984 patent, Col. 3:39-41; 5:8-12; 6:42-43.) The recited "gatherers" and "information source modules" play a significant role in permitting the claimed method to be performed. Thus, prior to the invention claimed in the '984 patent, there was no mechanism for collecting network usage information from the various network sources in a

usable form, as different network devices collect information in different formats, at different layers of the network.

101. Claim 13 also recites that each information source module (ISM) is capable of communicating using a protocol, or communication language, specific to the network device to which it is coupled. As embodied by the claim language, different network devices collect information in different formats, at different layers of the network, and thus the recited "information source modules" are specialized modules designed to communicate with the specific type of network devices to which they are coupled using a particular protocol. ('987 patent, Col. 3:39-41; 5:8-12; 6:42-43.) The recited "information source modules" play a significant role in permitting the claimed method to be performed. Thus, the communication of ISMs with network devices in a particular protocol is not a conventional task that can be performed by a human being or by general purpose computer, as it requires that the ISM be able to collect and interpret raw electronic communications transmitted from the network device.

102. Claim 13 also recites that the gatherers are "positioned on a segment of the network on which the network devices coupled thereto are positioned for minimizing an impact of the gatherers on the network," adding further structure to the claim. In addition, the claim recites that data is collected in "real-time," or in a manner which ensures no more than a fixed latency. The positioning of gatherers close to the network devices from which they collect is not a conventional task that can be performed by a human being or by general purpose computer, as network devices, such as routers, firewalls, DNS servers, etc., can be distributed all over the world and it would be impossible for human beings or a general purpose computer to collect data from such devices in real-time.

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103. Claim 13 further recites computer code for "filtering and aggregating" the network usage information collected from the network devices. Filtering and aggregating network usage information can be difficult because the usage information collected from different sources is generally available in different formats and thus, must be normalized by extracting the fields needed for accounting and billing and filling in any fields that may be missing. ('984 patent, Col. 6:43-45.)

104. The filtering and aggregation of network usage information obtained from different network sources is not a conventional task that can be performed by a human being or by general purpose computer. Unlike traditional circuit-switched networks, where network usage could easily be tracked to a particular user because each user had a fixed identifier, *i.e.*, a telephone number, in packet-switched networks, such as those described in the '984 patent, the information tracked by various network devices is not always standardized, is often provided in different formats, and is too raw to provide useful information regarding usage. ('984 patent, Col. 3:12-14; 6:41-42.) Thus, raw electronic usage information must be filtered and aggregated in order to discern usage information for a particular user. Such filtering and aggregation cannot be done by a human being or by general purpose computer.

105. Claim 13 further recites computer code for "completing" a plurality of data records, which correspond to network usage by a plurality of users. I have been informed and understand that "complete" has been construed to mean to "enhance a record until all required fields have been populated" and that the term "completing" incorporates the construction of "enhance" ("to apply a number of field enhancements in a distributed fashion"). I have also been informed and understand that the Court explained that "in a distributed fashion" means that network accounting records are collected and processed "close to the source of the network

usage information." In other words, data extracted from a particular network source is processed close to the network source where that data was collected. Distributed enhancement eliminates capacity bottlenecks, improving the scalability and efficiency of the system by reducing the volume of data sent on the network.

106. Distributed enhancement as described and claimed in the '984 patent cannot be performed by a human being or by a general purpose computer. In prior art circuit-switched networks, information about the connection was maintained by the network and did not need to be collected from individual network components. The circuit established between the calling party and the called party remains the same no matter how many intermediate devices are used to transmit the call. Thus there was no need to collect or process data close to its source. In packet-switched networks, such as those described in the '984 patent, raw usage data is collected from various sources and must be enhanced once collected to ensure all necessary information is obtained for billing and accounting. ('984 patent, Col. 3:12-14.) Such enhancement of raw usage data cannot be done by a human being or by general purpose computer.

107. Claim 13 also recites computer code for storing the collected, aggregated, filtered, and completed data records in a database, such that they can be used later to "retriev[e] information on the collection of the network usage information from the network devices" and "output[] a report." These limitations are directed to a particular application of using network usage records and play a significant role in permitting the claimed method to be performed.

108. In summary, a person of ordinary skill in the art would understand that each of the elements of claim 13 of the '984 patent imposes structural limitations that play a significant role in permitting the claimed method to be performed. These limitations cannot be performed by a human being or a general purpose computer, as they require collecting, aggregating, filtering,

and enhancing raw electronic network records that are captured by different network devices, at different network layers, in different formats, and are processed close to the source of the collected information. Moreover, the claims recite a particular structure for how such records are collected and generated, *i.e.*, gatherers, including ISMs, are coupled to network devices, are located in the same network segment as the network devices to which they are couple, and are capable of communicating in the same protocol as the network device. Thus, a person of ordinary skill in the art would understand that the elements of claim 13 add significantly more to any alleged abstract idea embodied in that claim.

D. Independent Claim 16 of the '510 Patent

109. Independent claim 16 of the '510 patent is a "computer program product" claim that reads:

> 16. A computer program product stored in a computer readable medium for reporting on a collection of network usage information from a plurality of network devices, comprising:
>
> computer code for collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers;
>
> computer code for filtering and aggregating the network communications usage information;
>
> computer code for completing a plurality of data records from the filtered and aggregated network communications usage information, the plurality of data records corresponding to network usage by a plurality of users;
>
> computer code for storing the plurality of data records in a database;
>
> computer code for submitting queries to the database utilizing predetermined reports for retrieving information on the collection of the network usage information from the network devices; and
>
> computer code for outputting a report based on the queries;
>
> wherein resource consumption queries are submitted to the database utilizing the reports for retrieving information on resource consumption in a network; and

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> wherein a resource consumption report is outputted based on the resource consumption queries.

110. A person of ordinary skill in the art would understand that claim 16 is not directed to an abstract idea, but rather provides an innovative manner for collecting, filtering, aggregating, enhancing, completing, and generating reports on network usage information from multiple network devices in packet-based networks such as the Internet. Claim 16 is not directed to conventional or intangible concepts, but is directed to a concrete computer program product that offers an improvement in the technological field of computer networks. In particular, claim 16 improves the ability to account and bill for services provided in a computer network by providing a specific manner for collecting, filtering, aggregating, and reporting on raw network usage records "in a distributed fashion."

111. A person of ordinary skill in the art would understand that the specific elements of claim 16 (*i.e.*, "a plurality of network devices at a plurality of layers," filtering and aggregating, completing, etc.) add significantly more to any alleged abstract idea embodied by claim 16.

112. In particular, claim 16 recites computer code for collecting network usage information from a plurality of network devices, such as routers, switches, firewalls, authentication servers, Web hosts, DNS servers, etc. Claim 16 further recites that this collection takes place at a plurality of layers in the network.

113. The collection of network accounting records from network sources is not a conventional task that can be performed by a human being or by general purpose computer. As embodied by the claim language, different network devices collect information at different layers of the network. Moreover, different network devices collect information in different formats. ('510 patent, Col. 7:5-6.) Thus, collection must be performed by specialized devices designed to collect from specific types of network devices. Thus, prior to the invention claimed in the '510

patent, there was no mechanism for collecting network usage information from the various network sources in a usable form, as different network devices collect information in different formats, at different layers of the network.

114. Claim 16 also recites that data is collected in "real-time," or in a manner which ensures no more than a fixed latency. Collection of data from the network devices in real-time is not a conventional task that can be performed by a human being or by general purpose computer, as network devices, such as routers, firewalls, DNS servers, etc., can be distributed all over the world and it would be impossible for human beings or a general purpose computer to collect data from such devices in real-time.

115. Claim 16 further recites computer code for "filtering and aggregating" the network usage information collected from the network devices. Filtering and aggregating network usage information can be difficult because the usage information collected from different sources is generally available in different formats and thus, must be normalized by extracting the fields needed for accounting and billing and filling in any fields that may be missing. ('510 patent, Col. 7:6-8.)

116. The filtering and aggregation of network usage information obtained from different network sources is not a conventional task that can be performed by a human being or by general purpose computer. Unlike traditional circuit-switched networks, where network usage could easily be tracked to a particular user because each user had a fixed identifier, *i.e.*, a telephone number, in packet-switched networks, such as those described in the '510 patent, the information tracked by various network devices is not always standardized, is often provided in different formats, and is too raw to provide useful information regarding usage. ('510 patent, Col. 3:43-45; 7:5-6.) Thus, raw electronic usage information must be filtered and aggregated in

order to discern usage information for a particular user. Such filtering and aggregation cannot be done by a human being or by general purpose computer.

117. Claim 16 further recites computer code for "completing" a plurality of data records, which correspond to network usage by a plurality of users. I have been informed and understand that "complete" has been construed to mean to "enhance a record until all required fields have been populated" and that the term "completing" incorporates the construction of "enhance" ("to apply a number of field enhancements in a distributed fashion"). I have also been informed and understand that the Court explained that "in a distributed fashion" means that network accounting records are collected and processed "close to the source of the network usage information." In other words, data extracted from a particular network source is processed close to the network source where that data was collected. Distributed enhancement eliminates capacity bottlenecks, improving the scalability and efficiency of the system by reducing the volume of data sent on the network.

118. Distributed enhancement as described and claimed in the '510 patent cannot be performed by a human being or by a general purpose computer. In prior art circuit-switched networks, information about the connection was maintained by the network and did not need to be collected from individual network components. The circuit established between the calling party and the called party remains the same no matter how many intermediate devices are used to transmit the call. Thus there was no need to collect or process data close to its source. In packet-switched networks, such as those described in the '510 patent, raw usage data is collected from various sources and must be enhanced once collected to ensure all necessary information is obtained for billing and accounting. ('510 patent, Col. 3:44-46.) Such enhancement of raw usage data cannot be done by a human being or by general purpose computer.

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119. Claim 16 also recites computer code for storing the collected, aggregated, filtered, and completed data records in a database, and submitting "queries" to the database to output reports related to consumption. These limitations are directed to a particular application of using network usage records and play a significant role in permitting the claimed method to be performed.

120. In summary, a person of ordinary skill in the art a would understand that each of the elements of claim 16 of the '510 patent imposes structural limitations that play a significant role in permitting the claimed method to be performed. These limitations cannot be performed by a human being or a general purpose computer, as they require collecting, aggregating, filtering, and enhancing raw electronic network records that are captured by different network devices, at different network layers, and are processed close to the source of the collected information. Thus, a person of ordinary skill in the art would understand that the elements of claim 16 add significantly more to any alleged abstract idea embodied in that claim.

E. Dependent Claims 17 and 19 of the '510 Patent

121. Dependent claim 17 of the '510 patent depends on claim 16 and recites "computer code for submitting network activity queries to the database utilizing the reports for retrieving information on activity of the network."

122. Dependent claim 19 of the '510 patent depends on claim 16 and recites "computer code for generating an alert upon occurrence of an event."

123. For all of the reasons discussed above with respect to independent claim 16, a person of ordinary skill in the art would understand that claims 17 and 19 are not directed to abstract ideas, but rather provide an innovative manner for collecting, filtering, aggregating, enhancing, and completing network usage information from multiple network devices in packet-based networks such as the Internet. Similarly, as discussed above for claim 16, claims 17 and

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19 are not directed to conventional or intangible concepts, but are directed to a concrete method that offers an improvement in the technological field of computer networks.

124. For all of the reasons discussed above with respect to independent claim 16, a person of ordinary skill in the art would understand that the specific elements of claim 16 (*i.e.*, "a plurality of network devices at a plurality of layers," filtering and aggregating, completing, etc.) add significantly more to any alleged abstract idea embodied by those claims.

125. Moreover, claims 17 and 19 include additional limitations that add structure to the claim. In particular, claims 17 and 19 require "computer code for submitting network activity queries to the database" and computer code for generating an "alert" upon the occurrence of an event, respectively. These limitations are directed to a particular application of using network usage records by describing how the raw usage information extracted from network devices can be tabulated and used effectively.

126. In summary, a person of ordinary skill in the art would understand that each of the elements of claims 17 and 19 of the '510 patent impose structural limitations that play a significant role in permitting the claimed product to operate. These limitations cannot be performed by a human being or a general purpose computer, as they require collecting, aggregating, filtering, and enhancing raw electronic network records that are captured by different network devices, at different network layers, and are processed close to the source of the collected information, and use of that information to generate reports and/or alerts on usage. Thus, a person of ordinary skill in the art would understand that the elements of claims 17 and 19 add significantly more to any alleged abstract idea embodied in those claims.

VII. THE '797 PATENT

127. The '797 patent is entitled "System, Method and Computer Program Product for Network Record Synthesis."

128. I understand that the ’797 patent was filed as a continuation-in-part of U.S. Patent Application No. 09/442,876, which later issued as U.S. Patent No. 6,418,467.

129. The ’797 patent builds on the distributed accounting and billing architecture described in the ’065, ’984, and ’510 patents. In particular, the ’797 patent describes a system and method for generating a single record reflecting multiple network services available in a data network for accounting purposes. A plurality of services – such as an hypertext transfer protocol (HTTP) session, an electronic mail session, and/or a voice over Internet Protocol (IP) session – are identified, data is collected describing the plurality of services and a single record is subsequently generated using the collected data to represent each of the services. (’797 patent, Abstract).

130. Prior to the invention of the ’797 patent, various levels of detailed information could be collected regarding numerous services available to a user via the Internet. Such information could be gathered with varied granularity depending on the accounting purposes. For example, billing was handled based on the duration of the dial-up session which could include all of the above services. However, there could have been situations where it was desired that billing be carried out as a function of the particular services used, *i.e.*, domain browsing, an email session, etc. Such types of accounting were becoming increasingly important since “always-on” (or permanent) connections, *e.g.*, DSL, Cable, GPRS, LAN, etc., were more and more prevalent, thus rendering billing based on a dial-up session obsolete.

131. With opportunities to use such diversified records of Internet usage, there was a need to collect usage data in an organized manner. Existing billing methods failed to allow versatility to be introduced into the tracking process. In particular, as the amount of available tracking data increased, so did the complexity in handling such accounting information. An

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example of such complexity was exhibited when trying to organize a report on services provided to a single customer.

132. The invention claimed in the ’797 patent solved this problem by generating a single record reflecting multiple services for accounting purposes.

133. I have been informed and understand that Openet contends that the claims of the ’797 patent are directed to the abstract idea of “the creation of a single record for accounting purposes from information collected from two of the specified services.”

134. A person of ordinary skill in the art would understand that the claims of the ’797 patent are not directed to abstract ideas, but rather provide an innovative mechanism for collecting and generating reports on network usage for various services, such as an HTTP session, an electronic mail session, and/or a voice over IP session, available in packet-based networks such as the Internet. The claims of the ’797 patent are not directed to conventional or intangible concepts, but are directed to concrete systems and methods that offer an improvement in the field of computer networks.

135. A person of ordinary skill in the art would also understand that the specific elements of each of the claims add significantly more to any alleged abstract idea embodied in the ’797 patent, as described in more detail below.

A. Independent Claim 1

136. Independent claim 1 of the ’797 patent is a method claim that reads (as corrected)[1]:

> 1. A method for generating a single record reflecting multiple services for accounting purposes, comprising:
>
> (a) identifying a plurality of services carried out over a network;

[1] The U.S. Patent and Trademark Office issued a Certificate of Correction of the ’797 patent on June 22, 2010, which corrected independent claims 1 and 19 of the patent.

(b) collecting data describing the plurality of services; and

(c) generating a single record including the collected data, wherein the single record represents each of the plurality of services;

wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;

wherein the data is collected utilizing an enhancement procedure defined utilizing a graphic user interface by:

listing a plurality of available functions to be applied in real-time prior to end-user reporting,

allowing a user to choose at least one of a plurality of fields, and

allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.

137. A person of ordinary skill in the art would understand that claim 1 is not directed to an abstract idea, but rather provides an innovative manner for collecting and generating reports on network usage for various services, such as an HTTP session, an electronic mail session, and/or a voice over IP session, available in packet-based networks such as the Internet. Claim 1 is not directed to conventional or intangible concepts, but is directed to a concrete method that offers an improvement in the technological field of computer networks. In particular, claim 1 improves the ability to account and bill for a plurality of services carried out over a computer network by providing a specific manner for identifying, collecting, and generating a single record based on raw network usage records.

138. A person of ordinary skill in the art would understand that the specific elements of claim 1 (*i.e.*, identifying and collecting data regarding “a plurality of services” using an “enhancement procedure,” generating a “single record,” etc.) add significantly more to any alleged abstract idea embodied by claim 1.

139. In particular, claim 1 recites a method for identifying a plurality of services carried out over a network, collecting information regarding usage of those services using an “enhancement procedure,” and organizing the information collected into a usable single record that reflects usage of all services.

140. The collection and organization of network accounting records from network sources is not a conventional task that can be performed by a human being or by general purpose computer. Information about the various network services is available in various levels of detail and in various formats. Because of the diverse formats in which information regarding different services is available, it can be complicated to collect and organize that data into a usable form. Thus, prior to the invention claimed in the ’797 patent, NSPs or ISPs were forced to bill for network services based on the duration of the connection, rather than the specific use of particular network services.

141. Claim 1 also recites that information about the various network services be collected using an “enhancement procedure.” In particular, the “enhancement procedure” is defined by the user using a graphical user interface (GUI) to select the functions to be applied to particular fields of data. Through the enhancement procedure, particular functions are applied to collected data records to yield organized information regarding the use of various network services.

142. Although the user can set the parameters for “enhancement,” the “enhancement procedure” recited in claim 1 cannot be performed by a human being or by a general purpose computer. In packet-switched networks, such as those described in the ’797 patent, raw electronic usage data for various network services is collected from several different network

devices and must be enhanced once collected in order to ensure all necessary information is obtained according to the parameters set by the user.

143. Claim 16 also recites that data is collected in "real-time," or in a manner which ensures no more than a fixed latency. Collection of data from the network devices in real-time is not a conventional task that can be performed by a human being or by general purpose computer, as network devices, such as routers, firewalls, DNS servers, etc., can be distributed all over the world and it would be impossible for human beings or a general purpose computer to collect data from such devices in real-time.

144. In summary, a person of ordinary skill in the art would understand that each of the elements of claim 1 of the '797 patent imposes structural limitations that play a significant role in permitting the claimed method to be performed. These limitations cannot be performed by a human being or a general purpose computer, as they require use of an enhancement procedure to collect raw electronic records regarding different network services, such as an HTTP session, an electronic mail session, and/or a voice over IP session, that are captured by different network devices in real-time. Thus, a person of ordinary skill in the art would understand that the elements of claim 1 add significantly more to any alleged abstract idea embodied in that claim.

B. Dependent Claim 2

145. Dependent claim 2 of the '797 patent depends on claim 1, and recites "sending the single record to a Business Support System."

146. For all of the reasons discussed above with respect to independent claim 1, a person of ordinary skill in the art would understand that claim 2 is not directed to an abstract idea, but rather provides an innovative manner for collecting and generating reports on network usage for various services, such as an HTTP session, an electronic mail session, and/or a voice over IP session, available in packet-based networks such as the Internet. Similarly, for the same

reasons as discussed above for claim 1, claim 2 is not directed to conventional or intangible concepts, but is directed to a concrete method that offers an improvement in the technological field of computer networks.

147. For all of the reasons discussed above with respect to independent claim 1, a person of ordinary skill in the art would understand that the specific elements of claim 2 (*i.e.*, identifying and collecting data regarding "a plurality of service" using an "enhancement procedure," generating a "single record," etc.) add significantly more to any alleged abstract idea embodied by that claim.

148. Moreover, claim 2 includes an additional limitation that adds structure to the claim. In particular, claim 2 recites that the single record be sent to a "Business Support System." This limitation is directed to a particular application of using network usage records by describing how the raw usage information extracted from network devices can be used in a particular environment.

149. In summary, a person of ordinary skill in the art would understand that each of the elements of claim 2 of the '797 patent imposes structural limitations that play a significant role in permitting the claimed method to be performed. These limitations cannot be performed by a human being or a general purpose computer, as they require use of an enhancement procedure to collect raw electronic records regarding different network services, such as an HTTP session, an electronic mail session, and/or a voice over IP session, that are captured by different network devices in real-time. Thus, a person of ordinary skill in the art would understand that the elements of claim 2 add significantly more to any alleged abstract idea embodied in that claim.

C. Independent Claim 7

150. Independent claim 7 of the '797 patent is a "computer program product" claim that reads:

7. A computer program product embedded into computer readable medium for generating a single record reflecting multiple services for accounting purposes, comprising:

(a) computer code for identifying a plurality of services carried out over a network;

(b) computer code for collecting data describing the plurality of services; and

(c) computer code for generating a single record including the collected data, wherein the single record represents each of the plurality of services;

> wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;
>
> wherein the data is collected utilizing an enhancement procedure defined utilizing a graphic user interface by:
>
> > listing a plurality of available functions to be applied in real-time prior to end-user reporting,
> >
> > allowing a user to choose at least one of a plurality of fields, and
> >
> > allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.

151. A person of ordinary skill in the art would understand that claim 7 is not directed to an abstract idea, but rather provides an innovative manner for collecting and generating reports on network usage for various services, such as an HTTP session, an electronic mail session, and/or a voice over IP session, available in packet-based networks such as the Internet. Claim 7 is not directed to conventional or intangible concepts, but is directed to a concrete computer program product that offers an improvement in the technological field of computer networks. In particular, claim 7 improves the ability to account and bill for a plurality of services carried out over a computer network by providing a specific manner for identifying, collecting, and generating a single record based on raw network usage records.

152. A person of ordinary skill in the art would understand that the specific elements of claim 7 (*i.e.*, identifying and collecting data regarding "a plurality of service" using an

"enhancement procedure," generating a "single record," etc.) add significantly more to any alleged abstract idea embodied by claim 7.

153. In particular, claim 7 recites computer code for identifying a plurality of services carried out over a network, collecting information regarding usage of those services using an "enhancement procedure," and organizing the information collected into a usable single record that reflects usage of all services.

154. The collection and organization of network accounting records from network sources is not a conventional task that can be performed by a human being or by general purpose computer. Information about the various network services is available in various levels of detail and in various formats. Because of the diverse formats in which information regarding different services are available, it can be complicated to collect and organize that data into a usable form. Thus, prior to the invention claimed in the '797 patent, NSPs or ISPs were forced to bill for network services based on the duration of the connection, rather than the specific use of particular network services.

155. Claim 1 also recites that information about the various network services be collected using an "enhancement procedure." In particular, the "enhancement procedure" is defined by the user using a graphical user interface (GUI) to select the functions to be applied to particular fields of data. Through the enhancement procedure, particular functions are applied to collected data records to yield organized information regarding the use of various network services.

156. Although the user can set the parameters for "enhancement," the "enhancement procedure" recited in claim 1 cannot be performed by a human being or by a general purpose computer. In packet-switched networks, such as those described in the '797 patent, raw

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electronic usage data for various network services is collected from several different network devices and must be enhanced once collected in order to ensure all necessary information is obtained according to the parameters set by the user.

157. Claim 1 also recites computer code for collecting data in "real-time," or in a manner which ensures no more than a fixed latency. Collection of data from the network devices in real-time is not a conventional task that can be performed by a human being or by a general purpose computer, as network devices, such as routers, firewalls, DNS servers, etc., can be distributed all over the world and it would be impossible for human beings or a general purpose computer to collect data from such devices in real-time.

158. Claim 1 also recites computer code for generating a "single record," which reflects usage of each of the plurality of services. This limitation is directed to a particular application of using network usage records by describing how the raw usage information extracted from network devices can be organized in an effective manner.

159. In summary, a person of ordinary skill in the art would understand that each of the elements of claim 7 of the '797 patent imposes structural limitations that play a significant role in permitting the claimed method to be performed. These limitations cannot be performed by a human being or a general purpose computer, as they require use of an enhancement procedure to collect raw electronic records regarding different network services, such as an HTTP session, an electronic mail session, and/or a voice over IP session, that are captured by different network devices in real-time. Thus, a person of ordinary skill in the art would understand that the elements of claim 7 add significantly more to any alleged abstract idea embodied in that claim.

D. Dependent Claim 8

160. Dependent claim 8 of the '797 patent depends on claim 7, and recites "computer code for sending the single record to a Business Support System."

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161. For all of the reasons discussed above with respect to independent claim 7, a person of ordinary skill in the art would understand that claim 8 is not directed to an abstract idea, but rather provides an innovative manner for collecting and generating reports on network usage for various services, such as an HTTP session, an electronic mail session, and/or a voice over IP session, available in packet-based networks such as the Internet. Similarly, for the same reasons as discussed above for claim 8, claim 8 is not directed to conventional or intangible concepts, but is directed to a concrete method that offers an improvement in the technological field of computer networks.

162. For all of the reasons discussed above with respect to independent claim 7, a person of ordinary skill in the art would understand that the specific elements of claim 8 (*i.e.*, identifying and collecting data regarding "a plurality of service" using an "enhancement procedure," generating a "single record," etc.) add significantly more to any alleged abstract idea embodied by that claim.

163. Moreover, claim 8 includes an additional limitation that adds structure to the claim. In particular, claim 8 recites that the single record be sent to a "Business Support System." This limitation is directed to a particular application of using network usage records by describing how the raw usage information extracted from network devices can be used in a particular environment.

164. In summary, a person of ordinary skill in the art would understand that each of the elements of claim 8 of the '797 patent imposes structural limitations that play a significant role in permitting the claimed method to be performed. These limitations cannot be performed by a human being or a general purpose computer, as they require use of an enhancement procedure to collect raw electronic records regarding different network services, such as an HTTP session, an

electronic mail session, and/or a voice over IP session, that are captured by different network devices in real-time. Thus, a person of ordinary skill in the art would understand that the elements of claim 8 add significantly more to any alleged abstract idea embodied in that claim.

E. Independent Claim 19

165. Independent claim 19 of the ’797 patent is a method claim that reads (as corrected):

> 19. A method for generating a single record reflecting multiple services, comprising:
>
> (a) collecting data with different formats describing a plurality of services;
>
> (b) collecting data with different formats describing users of the services;
>
> (c) generating a single record including the collected data representing each of the services and the users;
>
> (d) collecting a plurality of the single records;
>
> (e) generating a distinct record including the collected data of each of the single records, wherein the distinct record represents each of the plurality of single records; and
>
> (f) sending the distinct record to a Business Support System;
>
> > wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;
> >
> > wherein the data is collected utilizing an enhancement procedure defined utilizing a graphic user interface by:
> >
> > > listing a plurality of available functions to be applied in real-time prior to end-user reporting,
> > >
> > > allowing a user to choose at least one of a plurality of fields, and
> > >
> > > allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.

166. A person of ordinary skill in the art would understand that claim 19 is not directed to an abstract idea, but rather provides an innovative manner for collecting and generating

reports on network usage for various services, such as an HTTP session, an electronic mail session, and/or a voice over IP session, and for various users of those services, in packet-based networks such as the Internet. Claim 19 is not directed to conventional or intangible concepts, but is directed to a concrete method that offers an improvement in the technological field of computer networks. In particular, claim 19 improves the ability to account and bill for a plurality of services carried out over a computer network by providing a specific manner for identifying, collecting, and generating a distinct record based on raw network usage records.

167. A person of ordinary skill in the art would understand that the specific elements of claim 1 (*i.e.*, identifying and collecting data regarding "a plurality of service," and which describes "users of the service" using an "enhancement procedure," generating a "single record" and a "distinct record," etc.) add significantly more to any alleged abstract idea embodied by claim 19.

168. In particular, claim 19 recites a method for collecting data with different formats describing a plurality of services carried out over a network, collecting information regarding usage of those services using an "enhancement procedure," and organizing the information collected into a usable single record that reflects usage of all services.

169. The collection and organization of network accounting records from network sources is not a conventional task that can be performed by a human being or by general purpose computer. As embodied by the claim language, different network devices collect information about network services in different formats. ('797 patent, Col. 8:59-60.) Information about the various network services is available in various levels of detail. Because of the diverse formats in which information regarding different services are available, it can be complicated to collect and organize that data into a usable form. Thus, prior to the invention claimed in the '797 patent,

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NSPs or ISPs were forced to bill for network services based on the duration of the connection, rather than the specific use of particular network services.

170. Claim 19 also recites collecting information regarding the users of the network services. Data regarding the users of the network services is also available in different formats. (’797 patent, Col. 8:59-60.) The collection of information regarding the users of network services is not a conventional task that can be performed by a human being or by general purpose computer. Unlike traditional circuit-switched networks, where network usage could easily be tracked to a particular user because each user had a fixed identifier, *i.e.*, a telephone number, in packet-switched networks, such as those described in the ’797 patent, the information tracked by various network devices is not always standardized, is often provided in different formats, and is too raw to provide useful information regarding usage. (’797 patent, Col. 8:59-60.) Thus, raw electronic usage information must be correlated in order to discern usage information for a particular user. Such information cannot be collected by a human being or by general purpose computer.

171. Claim 19 also recites that information about the various network services be collected using an “enhancement procedure.” In particular, the “enhancement procedure” is defined by the user using a graphical user interface (GUI) to select the functions to be applied to particular fields of data. Through the enhancement procedure, particular functions are applied to collected data records to yield organized information regarding the use of various network services.

172. Although the user can set the parameters for “enhancement,” the “enhancement procedure” recited in claim 19 cannot be performed by a human being or by a general purpose computer. In packet-switched networks, such as those described in the ’797 patent, raw

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electronic usage data for various network services is collected from several different network devices and must be enhanced once collected in order to ensure all necessary information is obtained according to the parameters set by the user.

173. Claim 19 also recites that data is collected in "real-time," or in a manner which ensures no more than a fixed latency. Collection of data from the network devices in real-time is not a conventional task that can be performed by a human being or by general purpose computer, as network devices, such as routers, firewalls, DNS servers, etc., can be distributed all over the world and it would be impossible for human beings or a general purpose computer to collect data from such devices in real-time.

174. Claim 1 also recites computer code for generating a "single record," which reflects usage of each of the plurality of services. Claim 19 further requires collecting a plurality of single records and combining those records in an organized fashion to create a "distinct record." This limitation is directed to a particular application of using network usage records by describing how the raw usage information extracted from network devices can be organized in an effective manner.

175. In summary, a person of ordinary skill in the art would understand that each of the elements of claim 19 of the '797 patent imposes structural limitations that play a significant role in permitting the claimed method to be performed. These limitations cannot be performed by a human being or a general purpose computer, as they require use of an enhancement procedure to collect raw electronic records regarding different network services, such as an HTTP session, an electronic mail session, and/or a voice over IP session, that are captured by different network devices in real-time. Thus, a person of ordinary skill in the art would understand that the elements of claim 19 add significantly more to any alleged abstract idea embodied in that claim.

VIII. CONCLUSION

176. I declare under penalty of perjury that the foregoing is true and correct.

Executed: October 10, 2014
in Atlanta, Georgia

E. W. Zegura
Dr. Ellen W. Zegura

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IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff, v. OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., An Irish Corporation, Defendants.	Case No. 1:10-cv-910 (LMB/TRJ) **JURY TRIAL DEMANDED**

OPENETS' REPLY IN SUPPORT OF THEIR MOTION FOR JUDGMENT ON THE PLEADINGS THAT AMDOCS' ASSERTED PATENT CLAIMS ARE INVALID UNDER 35 U.S.C. § 101

the sort of 'additional feature that provides any practical assurance that the process is more than a drafting effort designed to monopolize the abstract idea itself.").

Amdocs also cannot point to any actual functions that the patented method itself could transform the abstract idea into patent eligible subject matter. That information may be collected and processed in "real time" and "close to the source," Opp'n at 25, is merely a means to describe the addition of a computer "function[ing] solely as an obvious mechanism for permitting a solution to be achieved more quickly." *Walker Digital*, 2014 WL 4365245, at *3 (quoting *SiRF Tech., Inc. v. Int'l Trade Comm'n*, 601 F.3d 1319, 1333 (Fed. Cir. 2010)); *see also Data Distrib.*, 2014 WL 4162765, at *11 (D.N.J. Aug. 19, 2014) ("[An] invention [that] 'addresses the need for ***immediate access*** to database records and the need to notify users of changes to database records . . . is undeniably abstract.") (emphasis added). The '984 and '510 patent claims are therefore invalid.

D. <u>The '797 Patent Is Invalid</u>

Amdocs gives only passing reference to the '797 patent in its opposition brief. That is presumably because the "creation of a single record for accounting purposes," claimed by the '797 patent, Opp'n at 20, "amounts to electronic recordkeeping—one of the most basic functions of a computer." *Alice*, 34 S.Ct. 2359 (quoting *Mayo*, 132 S.Ct. at 1297). As with the other patents, nothing in the claims ties the invention to a specific device, and insofar as a computer is required, for the reasons set forth above, that is a general purpose computer and incidental only to the claimed field of use. The '797 patent is therefore also invalid.

E. <u>The Court Should Disregard Dr. Zegura's Declaration</u>

In support of its opposition brief, Amdocs attached a declaration from its technical expert, Dr. Ellen Zegura. The Court should disregard that declaration for two independent reasons.

First, Dr. Zegura's declaration is used to back legally irrelevant assertions, such as Amdocs' arguments that "the '065 patent is directed to a specific improvement to packet-based network billing technology" (Opp'n at 15) and that "there is nothing conventional about collecting and processing network accounting records at their source" (Opp'n at 23). Even if such assertions were supported by the claim language and specification, they make no difference to patentability. As explained above, a field of use limitation does not impart patentability.

Second, Dr. Zegura's declaration is entirely irrelevant to the purely legal issue before the Court. It is well established that experts are prohibited from "offering opinions about legal issues that will determine the outcome of a case." *United States v. Sinclair*, 74 F.3d 753, 758 (7th Cir. 1996). The question of whether a claim is drawn to patent-eligible subject matter presents an issue of law. *See In re Bilski*, 545 F.3d 943, 951 (Fed. Cir. 2008); *Accenture Global Servs., GmbH v. Guidewire Software, Inc.*, 728 F.3d 1336, 1340-41 (Fed. Cir. 2013). Therefore, Dr. Zegura's testimony is irrelevant to the Court's § 101 determination and could not possibly "help the trier of fact" as no factual questions exist. *See also Digitech Info. Sys., Inc. v. BMW Fin. Servs. NA, LLC,* 864 F. Supp. 2d 1289, 1293 (M.D. Fla. Mar. 30, 2012) (rejecting Plaintiff's argument that expert reports are needed to determine whether the patent-at-issue contains patent-eligible subject matter, because "[i]ssues of patent-eligible subject matter are questions of law") (*quoting CyberSource Corp. v. Retail Decisions, Inc*., 654 F.3d 1366, 1369 (Fed. Cir. 2011)).

III. OPENET'S MOTION IS PROCEDURALLY PROPER

Because Amdocs cannot prevail on the merits, they point the Court to procedural objections in attempt to defeat Openet's motion. Specifically, Amdocs' assertion that Openet previously offered "identical arguments" that were rejected by this Court is both factually and legally inaccurate. Opp'n at 7.

UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff, vs. OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation, Defendants.	Civil Action No. 1:10cv910 Alexandria, Virginia October 16, 2014 10:24 a.m.

TRANSCRIPT OF MOTION HEARING
BEFORE THE HONORABLE LEONIE M. BRINKEMA
UNITED STATES DISTRICT JUDGE

APPEARANCES:

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(APPEARANCES CONT'D. ON PAGE 2)

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COMPUTERIZED TRANSCRIPTION OF STENOGRAPHIC NOTES

APPEARANCES: (Cont'd.)

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P R O C E E D I N G S

THE CLERK: Civil Action 10-910, Amdocs (Israel) Limited v. Openet Telecom, Inc., et al. Would counsel please note their appearances for the record.

MR. PANDYA: Good morning, Your Honor. Brian Pandya on behalf of the defendant, Openet. With me today is Jim Wallace.

MR. WALLACE: Good morning, Your Honor.

MR. PANDYA: And in the audience is Eric Weisblatt, Scott Felder, and Claire Frezza.

THE COURT: All right.

MR. WALDEN: Good morning, Your Honor. Calvin Walden from WilmerHale for Amdocs, the plaintiff, along with Greg Lantier, Violetta Watson, Brittany Amadi, and Vic Souto.

THE COURT: Good morning. Well, as you know, you're here today on the defendant Openet's motion to have the four patents at issue declared invalid under Section 101 in light of the Supreme Court ruling in *Alice* and its other related cases.

I think to begin with, Amdocs' argument that this motion should not be heard because somehow we've already resolved the issue about the patentability of the patents is not well made. The law has changed, in my view, dramatically since the last time you were all before us. The *Alice* decision clearly changes the landscape for these types of patents and for the Court's evaluation of patentability, and so I think it

is perfectly appropriate for this Court to be considering the arguments made in Openet's motion. So that argument I'm going to rule on from the bench and just indicate that Amdocs does not prevail on that.

So we are going to consider the patentability of all four patents, and that being the case, let me ask counsel for Amdocs why it was given the fact that the law has dramatically changed in this area, I think, and the number of cases where now district courts and the Federal Circuit are finding that patents are no longer patentable under 101, why you didn't use some good discretion in looking at your four patents and look at them differently. You put all four in one basket, but it looks to the Court as though the only one that you might be able to salvage is the '984.

MR. WALDEN: Your Honor, the, the fact is that we didn't put them all under one basket. We opposed their motion procedurally but substantively, also, and we went through each of the claims for each of the claims -- or each of the patents: the '065, the '984, and '510, and the '797, and as we also did, we submitted an expert declaration from our expert, Ellen Zegura, who went through each patent claim by claim.

So we do believe there are, there are some unifying reasons or there are some common reasons among the claims that they're not patent ineligible under Rule 101. So, for example, they're not business method patents, none of them. None of the

claims are business method claims. None of the claims are simply claims that address how to organize human activity.

So we did assert across all of the claims that none of the claims are invalid, but then we did go through each of the different patents and in the declaration as well, we went through each of the different claims and addressed each of them separately.

So, for example, the '065 patent, we believe, is patent eligible under 101, and we explained why, because it's directed towards building a better network accounting record, not an abstract idea. It is a system in which it has to be a distributed environment, so there's a particular architecture, there's a particular structure for those claims. So those claims are not invalid we explained as well.

The '984 and the '510 patents, which do kind of go together because the claims are similar, they have different reasons but additional reasons. They have -- not only are they in a distributed architecture and again are directed towards building a better network accounting record, but they also have a plurality of devices that are connected to a plurality of network elements, particular concrete, physical devices in the world, and they have to communicate with those devices using a, multiple protocols. They have to then generate records, put records and data into a database, query the database, and generate reports from those queries.

So the '510 and the '984 claims, again, we believe are eligible under 101 but for additional reasons.

THE COURT: If the Court were to find that the '510 is not eligible under Section 101, is it your view then that '984 also fails since you're connecting the two?

MR. WALDEN: I think there's -- there are -- I mean, I can go through the individual --

THE COURT: How would you distinguish the -- what is the invention in the '984 that is different from what's in the '510?

MR. WALDEN: Well, the '984 claims, the claims of the '984 are slightly different. The invention covers the same thing essentially, which is generating a complete network accounting record in a, in a packet-based network that uses the OSI matter -- model and then generating reports from those records.

The '510 patent claims similarly. The permutations of those are different. The permutations are different in the sense of what type of devices they connect to, RADIUS devices versus other types of devices. In the '984, they're very specific to what type of devices they connect to.

So in a sense, it's different permutations of a very similar concept.

THE COURT: All right, let me hear from Openet on that.

MR. PANDYA: Well, as Your Honor recognizes, the Supreme Court fundamentally changed the law on the patentability of data processing patents with its *Alice* case, and the arguments Amdocs makes are the same argument that almost every patentee that has seen its patent invalidated since *Alice* has tried to make. You know, Amdocs tries to argue that its patents are unique because they represent an improvement over prior art, they're a directed to telecommunications network, packet-based networks, the Internet, and that all may have been relevant before, it may not have been, but the courts have invalidated claims that are far more technical than the claims that are at issue here.

You know, with respect to the argument that this is directed to building a better network accounting record, it's still an accounting record. That's a method of organizing human activity, how much data are you consuming, what should the bill be.

Now, if you look at the patents in some other cases we've cited, many of the patents in those cases were far more technical than anything that's being claimed here in any of the four patents. *Digitech* took something called chromatic characteristic information and spatial characteristic information and using a, quote, device-dependent transformation, created a better digital image profile.

There was no question that computers were used in

there. The Federal Circuit even recognized in *Digitech* that the claim invention was an improvement over prior art digital image processing, but the Federal Circuit nonetheless held the claims invalid because at bottom, they were directed towards a process of organizing information through mathematical correlations.

You know, put another way, manipulating existing data so manipulating existing network accounting records to generate a better or more complete record, that may be entrepreneurial, that may be clever, it may have been clever in 1998, when these patents were filed, but that does no longer clear the *Alice* threshold.

THE COURT: And the problem in part is because of the preemption concern.

MR. PANDYA: That's correct. And, you know, one thing that's -- you know, one thing that's responsive to the arguments Amdocs made, in the *Loyalty Conversion* case, where Judge Bryson was, from the Federal Circuit was sitting by designation in Texas, you know, the patentee there tried to make the argument that the claims were highly specific, and Judge Bryson noted that under *Alice*, under the Supreme Court's new case law, the preemption can be narrow or it can be broad, but if the idea is abstract, if you're just taking one set of data, manipulating it around, making another set of data, that's an abstract idea, and no matter how many computers

you're using, limiting it to a field of use, using functional claims, that does nothing to save the patentability of the claim.

You know, that was a problem in the *Comcast v. Sprint* case. You know, the District of Delaware accepted the patentee's assertion the claims were narrowly directed to overcoming a specific problem with telephony networks by using telephony parameters to optimize bandwidth allocation. The court even noted that because the claim was drawn to telephony network optimization, the claims likely would have been performed by a telephony network, but the claim was still invalid because under *Alice,* you can't limit your claims to a specific technical environment, and that's been, that's been the case in all of the cases we've cited: *Eclipse*, *Walker*, *Planet Bingo*, *Loyalty Conversion*. You know, the list goes on and on.

And, you know, with respect to Amdocs' argument that they -- that, you know, it's directed to building a better network accounting record, that there's different devices used here, well, the patent specifications say that the network devices are any devices that could be included in a network. Gatherers can be any hardware and/or software used in a network.

The, the claim software uses normal user applications on Windows NT or UNIX. This is all from the patent

specifications, so even if we take Amdocs at face value that these claims have some, some narrowness, we don't think they do, but if they do, those are still general purpose computers. It's still just a computer instantiation of an, of an abstract idea of manipulating accounting and billing data, and that's why these patents should be held invalid under the new case law.

THE COURT: All right, do you want to respond?

MR. WALDEN: Your Honor, I'd like to address your question about preemption, and I think you hit the nail on the head that the main concern that is discussed in *Alice* and in earlier cases is whether or not you're trying to preempt a field.

So the question, I think, that needs to be asked of Openet in this case is what is the abstract idea that they keep saying the claims are? In this case, they started by saying, for example, that the abstract idea of the '065 is correlating and enhancing one network accounting record with data from a second record. Now, that doesn't to me sound like an abstract idea.

They said the '510 and '984 patents were the abstract idea of collecting and completing network usage information to create a database that can be queried and used to generate reports and alerts. That's just not abstract.

And then -- but then we explained why that wasn't

abstract in our opposition, and in their reply, they come back and they say Amdocs' patents are directed towards recordkeeping and commerce and therefore cover abstract ideas. And I just heard Mr. Pandya say the patents are directed towards manipulating data and therefore cover abstract ideas, but, of course, the claims cover much more than that. They are much more specific than that, and they don't preempt the field of manipulating commerce or manipulating data or recordkeeping.

For example, the '797 patent claims creating a single record that generates a data for multiple services. That's the '797 patent. You don't want to infringe that patent? Don't create a single record that generates data from multiple services. It's simple.

The '065 patent, you explained in your prior rulings, and the Federal Circuit has affirmed this, that the patents cover a specific type of architecture, a distributed architecture, meaning you have to do the enhancement close to the source where the records were collected. You don't want to infringe this patent? Don't, don't set up a distributed architecture.

THE COURT: Well, distributed architecture --

MR. WALDEN: Openet --

THE COURT: Whoa, whoa. But distributed architecture itself is a very general type of architecture. It's a generic type of architecture.

MR. WALDEN: But we didn't just claim a distributed architecture. We claimed collecting records from multiple sources, enhancing one record with data from another record in a distributed architecture to build a better record. They have to correlate. You have to enhance. You have to do all of these, these concepts.

So again, I ask what -- I mean, from the Openet side, what is the abstract concept? Is it correlating and enhancing one network accounting record with data from a second record, which I would submit is not abstract, especially when you put it in the context of a physical world where you have to have a distributed architecture and you're talking about collecting network accounting records from sources like hubs or routers or servers where the data is digital, it needs to be collected in real-time as explained in the patent and claimed in the '984 and '510 patent claims.

It has to be dealt with on an ephemeral basis, because the data is ephemeral. You get, for example, an IP address if you're using a cell phone. That address is useful information, but that address is going to be assigned to the next cell phone as soon as you log off. So your IP address is only associated with your name for a very short period of time, so you have to collect that data in real-time, you have to, you have to correlate it in a way that makes use of the data when it's collected, as Your Honor explained in your prior ruling on

the claim construction of the term "enhanced."

So if you don't want, if you don't want to preempt -- be preempted -- strike that. Sorry.

For the '984 and the '510 patents, if you don't want to practice the claims of that patent, then don't generate records and reports at the same time, or if you want to generate reports, don't generate reports about querying a database.

There are very specific ways. Don't use a plurality of layers. Don't use a plurality of protocols. Don't connect to a plurality of network devices. These are concrete limitations that are in the claims that should, that should give the Court comfort that we're not trying to preempt the field.

THE COURT: All right, thank you.

Last response, and then we'll --

MR. WALDEN: If I could, just one more thing?

THE COURT: Yeah.

MR. WALDEN: I don't know if we're going to touch on it, but we had been ordered to discuss a schedule.

THE COURT: Yeah, I think, I think that's premature, because depending upon what I do, it would significantly change things. For example, if I grant the plaintiff's -- the defendants' motion, then obviously, there's no need for a schedule. If I deny it or do it half and half, for example,

one of these patents like the '984 might survive and the others not, in which case, just looking at your proposed plan, even the *Markman* construction evaluation would change.

So I think until -- and I'm close to being able to get you an opinion probably next week. It won't hold things up that long. My plan is to rule on this motion and then depending upon that outcome, probably do a phone conference with you-all. I mean, I've got the draft that you've given me that I understand you had both agreed to, most of it, and then I can be looking at it, and you'll have a better context in which to be evaluating where you go from here.

MR. WALDEN: Okay. Understood. And we had asked for dates in 2015, so --

THE COURT: In terms of -- I can, I can put you at ease in that respect. I can give you which of those trial dates I would use, all right, so that you can set your calendars accordingly, and I have looked at it. The January trial date -- let me just double-check to make sure it doesn't bump into something else, but I think that's the better date. I have two calendars right now, so I have to make sure that I have them in sync.

I'm sorry, it was February you were looking at, right? February 9?

MR. WALDEN: February 9, that's correct.

THE COURT: And I think that was the one that looked

good. Yes, the February 9 was the date, so you can rest assured, you can go ahead and set your calendars for April on some other thing, but that would be the date if the case is going to go to trial, that would be the date it goes to trial.

MR. WALDEN: Okay.

THE COURT: All right?

MR. WALDEN: If I could, just a couple more points just in response to Mr. Pandya's arguments from before. Mr. Pandya brought up *Digitech*, and they briefed that, and we briefed it as well --

THE COURT: Right.

MR. WALDEN: -- but I just want to quote, the quote from the Court, the Federal Circuit is, "The method in the '415 patent claims an abstract idea because it describes a process of organizing information through mathematical correlations and is not tied to a specific structure or machine."

So it only described a process for mathematical correlations, not tied to a physical structure or a machine.

THE COURT: Yeah, but, you know, there's still a problem because in terms of tying to a specific structure or machine, if you just say "a computer," that's really not holding a whole lot of specificity. I mean, there are thousands of different types of computers.

MR. WALDEN: I understand, but we -- I would submit the claims of our patents add more than that. We talk about

being connected to, to particular types of network devices, RADIUS-type devices, proxy servers, things like that. We talk about being connected using particular protocols. These are not generic computer functions that we're talking about.

THE COURT: All right.

MR. WALDEN: And so, just my last point would be that I believe that the *Helios Software* case which came down from Judge Stark in Delaware is instructive, because it's post-*Alice*, there's the wave of 101 cases which we believe are really low-hanging fruit-type cases for the district courts for the most part. It's been business method patents. It's an easy distinction between, between what we are and what the case was in *Alice* or *Bilski* or the *Bingo* case or any of that.

But *Helios* actually dealt with patents, claims that were drawn through remotely monitoring data associated with an Internet session and controlling access. That is very similar to the way our claims are drawn, especially under the Court's construction that requires the remote -- sorry, the distributed architecture.

THE COURT: All right, thank you.

MR. WALDEN: Thank you.

THE COURT: Yes, sir.

MR. PANDYA: On *Helios*, what's missing here in Amdocs' claim is it was drawn to remotely monitoring Internet usage and controlling access, so that was actually served a

physical purpose, controlling access to network. There is no "and" in here.

With respect to the -- Amdocs talks about real-time. That argument was rejected in *Alice*. Those claims had, required real-time matching of two shadow records. *CMG Financial* required automatically processing, automatically processing data records.

The *buySAFE v. Google* case talked about using even a database as a basic computer function. A computer used only for processing is a basic function of any general purpose computer. That's what a database is, that's what a computer is, and the patent specifications all make clear that the components, whether it be a RADIUS server, a proxy server, Windows NT, UNIX, whatever, whatever other hardware/software, can be any software/hardware you find on a network that is used to perform the patent.

Last point: On the question of preemption, what Amdocs is pointing to are functional claiming limitations. They're saying it's limited to the function of a distributed network, limited to an Internet network, limited to a packet-based network.

Now, mind you, none of that's in the claims, but even if they were in the claims, those are functional limitations, which the Supreme Court said in *Alice*, the district court said in *Eclipse*, in *Digitech*, *Comcast*, *Walker Digital*, *Planet Bingo*,

Loyalty Conversion. The list goes on and on.

All of the patentholders in those cases made the same argument, that their claims had a specific instantiation that was limited to a certain environment. That is not enough to stop an abstract idea from preempting the field. The idea can be as narrow as you want it or as broad as you want it, but if it's limited only to a field, that does not save the patentability of claims under the new case law.

THE COURT: All right, thank you.

It's very interesting. This is my first post-*Alice* case, so obviously, I am going to have to spend -- I want to make sure I get it, I hope, right, but we've been working on this, and I am pretty confident you'll get an answer next week. I'm not going to keep you out there.

So again, after that, we'll see where we go in terms of any status issues that we need to -- or scheduling issues, but if the case survives the various hurdles that these cases have to go through, the trial will be on that February date, so that you don't have to worry about your calendars in April, all right?

Very good, we'll recess court until two o'clock.

MR. WALDEN: Thank you.

(Which were all the proceedings had at this time.)

CERTIFICATE OF THE REPORTER

I certify that the foregoing is a correct transcript of the record of proceedings in the above-entitled matter.

/s/
Anneliese J. Thomson

IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff, v. OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation, Defendants.	)	Case No. 1:10-cv-910 (LMB/TRJ)

NOTICE OF APPEAL

NOTICE IS HEREBY GIVEN that Plaintiff Amdocs (Israel) Limited hereby appeals to the United States Court of Appeals for the Federal Circuit from the Final Judgment entered in this action on the 24th day of October, 2014 (Dkt. 303), and from all other orders, rulings, findings, and conclusions underlying and related to that order.

Dated: November 21, 2014

Respectfully submitted,

/s/

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Exhibit G

US005784443A

United States Patent [19]

Chapman et al.

[11] **Patent Number: 5,784,443**

[45] **Date of Patent: Jul. 21, 1998**

[54] **INTEGRATED REVENUE DOMAIN FOR TELECOMMUNICATION NETWORKS**

[75] Inventors: **Jeffrey M. Chapman**, Cascade, Colo.; **John Reynolds**, Medway, Mass.; **Steve Brandenburg**, Marion, Iowa; **Samuel Howlette**, Great Falls, Va.

[73] Assignee: **MCI Corporation**, Washington, D.C.

[21] Appl. No.: **650,151**

[22] Filed: **Feb. 1, 1996**

[51] **Int. Cl.**[6] **H04M 15/00**; H04M 15/06

[52] **U.S. Cl.** **379/119**; 379/116; 379/120; 379/121; 379/112

[58] **Field of Search** 379/111, 112, 379/114, 115, 116, 119, 120, 121, 201, 208, 229, 230

[56] **References Cited**

U.S. PATENT DOCUMENTS

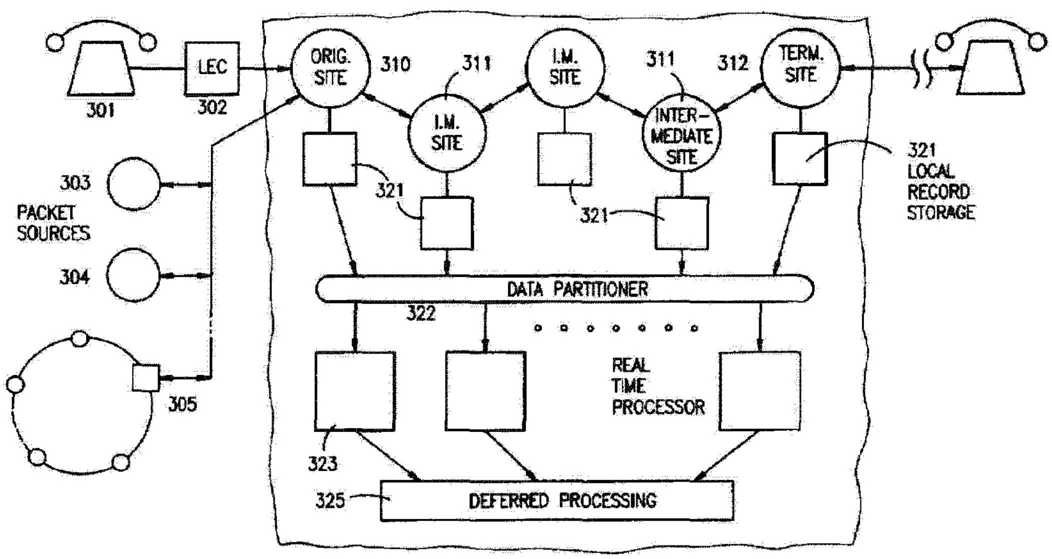
4,611,096 9/1986 Asmuth et al. 379/112
5,218,632 6/1993 Cool 379/119
5,345,501 9/1994 Shelton .
5,351,285 9/1994 Katz .
5,351,286 9/1994 Nici .
5,355,403 10/1994 Richardson et al. .
5,369,680 11/1994 Borbas et al. .
5,381,461 1/1995 Baals et al. .
5,537,611 7/1996 Rajagopal et al. 379/115
5,633,919 5/1997 Hogan et al. 379/115

Primary Examiner—Curtis Kuntz
Assistant Examiner—Paul Loomis

[57] **ABSTRACT**

A system and method automatically, in real-time, create and maintain records of customer use of a telecommunication network for diverse types of service and costs. Each customer use of the network is collected and tagged in a record as an event for each switching device in the network. Real-time event correlation based upon all tags is performed and combined into a standard record for each event. Additional information, e.g. pricing, tax, service is incorporated into the standard record as a basis for billing the customer for use of the diverse types of services and costs on the network.

10 Claims, 3 Drawing Sheets



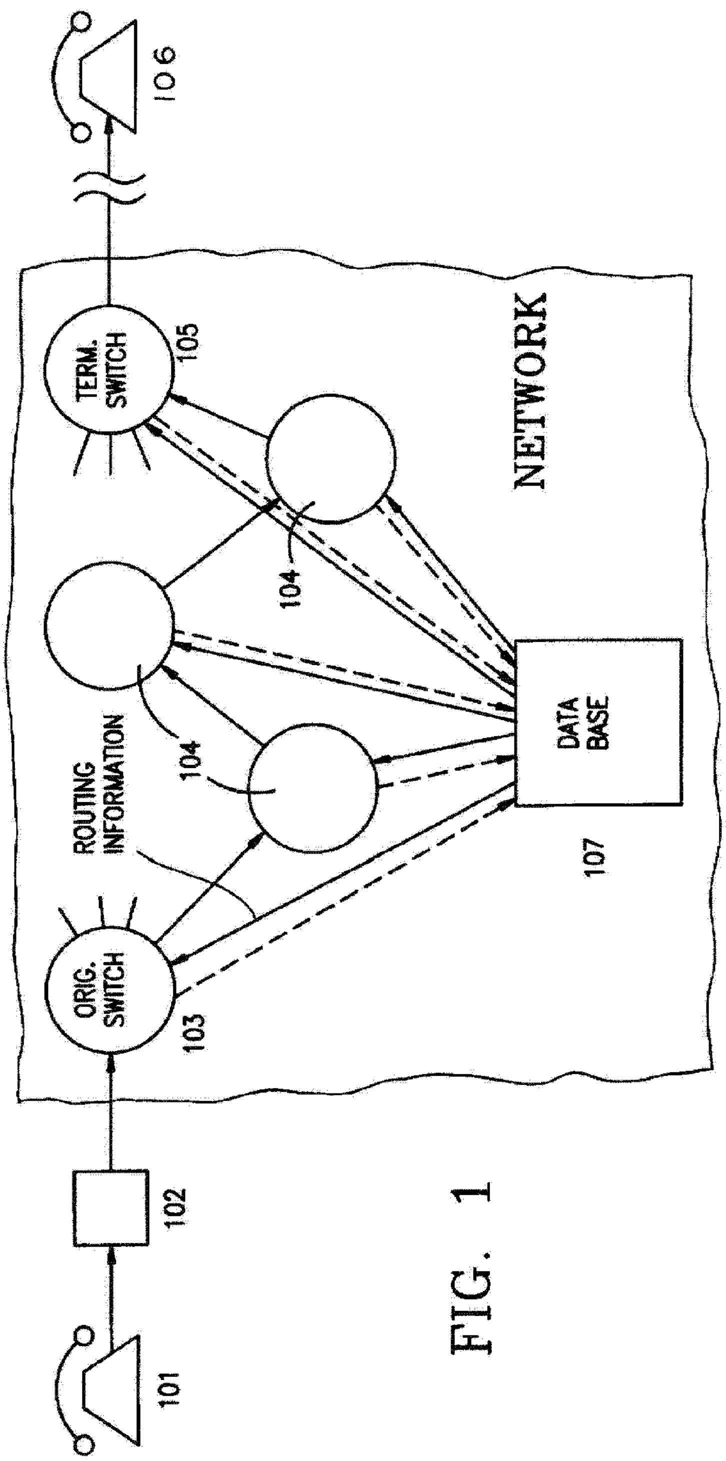


FIG. 1

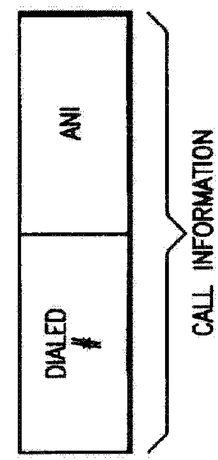


FIG. 2

OPENET00540664

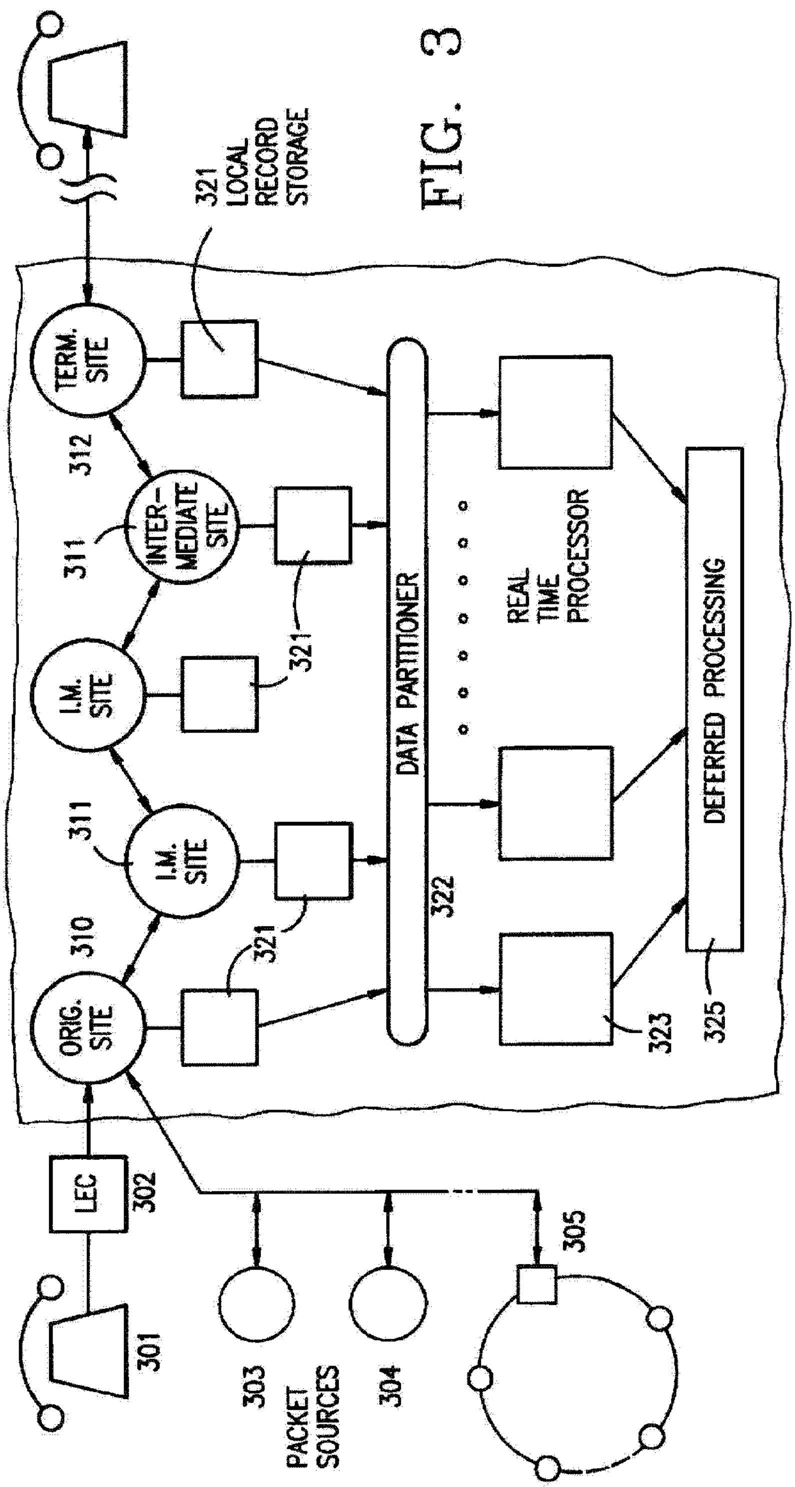
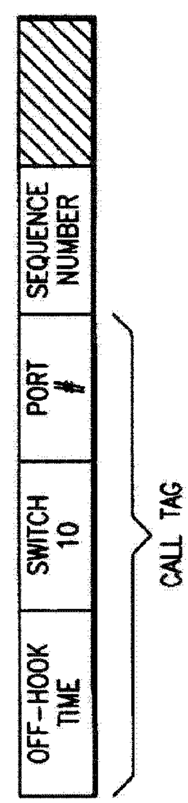

321 LOCAL RECORD STORAGE
TERM. SITE
312
INTER-MEDIATE SITE
311
I.M. SITE
311
I.M. SITE
310
ORIG. SITE
321
321
DATA PARTITIONER
322
REAL TIME PROCESSOR
DEFERRED PROCESSING
323
325
LEC
302
301
303
PACKET SOURCES
304
305

FIG. 3

FIG. 4


OFF-HOOK TIME
SWITCH 10
PORT #
SEQUENCE NUMBER
CALL TAG

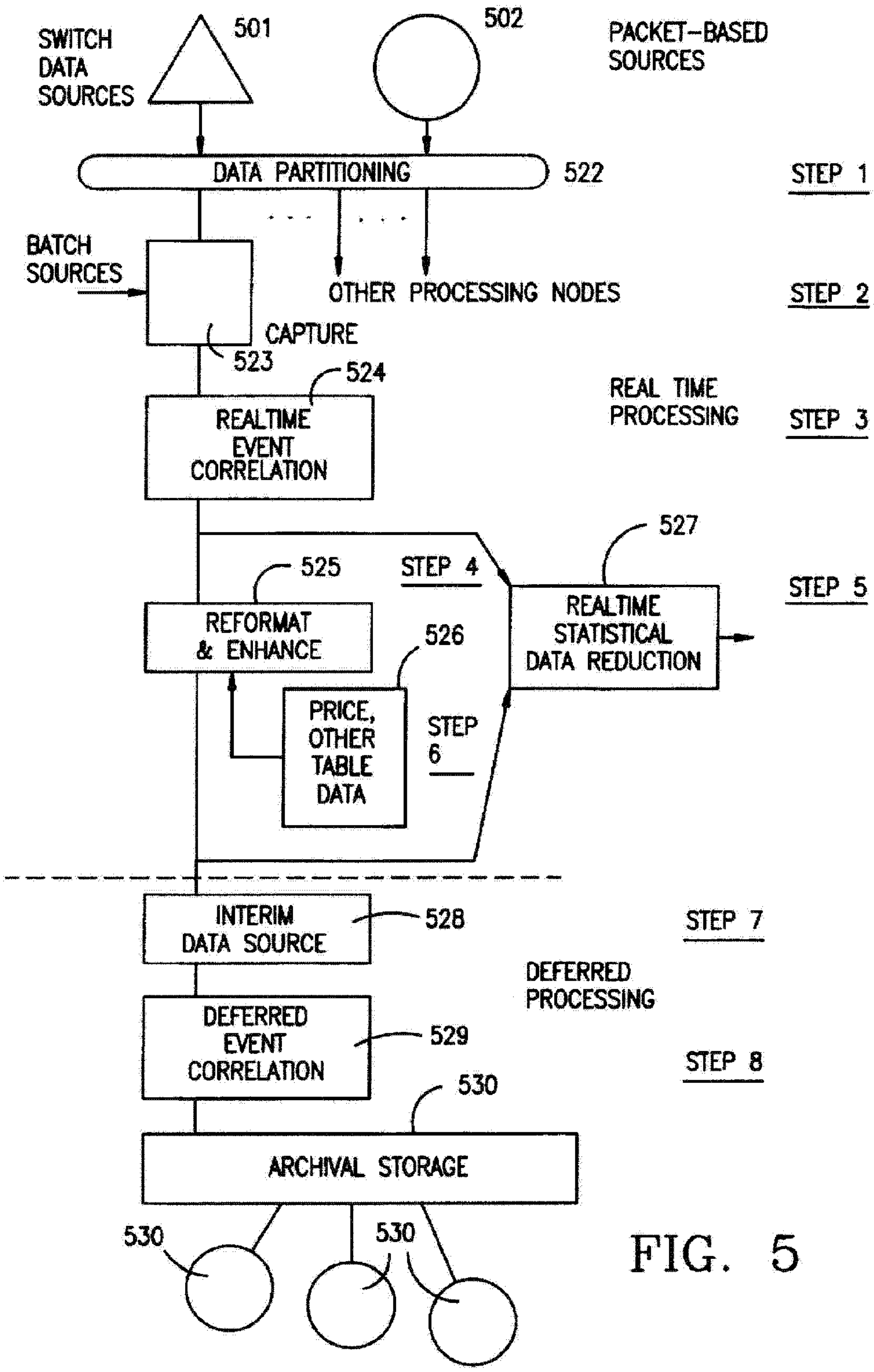

SWITCH DATA SOURCES
501
502
PACKET-BASED SOURCES
DATA PARTITIONING
522
STEP 1
BATCH SOURCES
OTHER PROCESSING NODES
STEP 2
CAPTURE
523
524
REALTIME EVENT CORRELATION
REAL TIME PROCESSING
STEP 3
527
525
STEP 4
STEP 5
REFORMAT & ENHANCE
526
REALTIME STATISTICAL DATA REDUCTION
PRICE, OTHER TABLE DATA
STEP 6
INTERIM DATA SOURCE
528
STEP 7
DEFERRED PROCESSING
DEFERRED EVENT CORRELATION
529
STEP 8
530
ARCHIVAL STORAGE
530
530

FIG. 5

INTEGRATED REVENUE DOMAIN FOR TELECOMMUNICATION NETWORKS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to telecommunications networks. More particularly, the invention relates to systems and methods for creating and maintaining records of customers' use of the resources of a communications network including compiling such records in a fast and versatile manner to provide billing and statistical information.

2. Description of the Prior Art

Users of current telephone and data communication networks often demand the use of a wide variety of network facilities that may be provided by more than one vendor. Each vendor is faced with the need to monitor network traffic, and to provide accurate billing consistent with the usage of the network. Flat-rate billing is inadequate since usage varies widely, yet in order to bill a client based upon usage of network facilities, user and call information must be tracked over the entire path of the call.

Limited exchange of user and call information between sites along a communications path is known. For example, U.S. Pat. No. 5,351,286 (Nici) teaches the use of two networks for communication, where, if a first user on an ISDN network wishes to connect to another user on a voice-band network, identity and account information is derived from the call set-up commands of the first user and passed to the provider of the voice-band network.

Even in such an environment, billing for services is problematic, as each facility must track users and generate usage summaries independently. This results either in high overhead (billing is compiled at each site and sent to user separately) or a significant delay as information is forwarded to a central billing site). Therefore, it would be useful to have a system for telecommunications networks that would automatically, and in real time, report information relating to all resources used by a network user during a call.

SUMMARY OF THE INVENTION

An object of the invention is a system and method for providing diverse types of pricing and billing information for customer use of telephone services offered by a telecommunications network.

Another object is a system and method to manage different types of telephone service products in a single stream process for a telephone company.

Another object is a system and method for handling customers on a specialized basis starting at a call record through to the billing process in a telecommunications network.

These and other objects, features and advantages are accomplished in a telecommunications network which provides means to compile and correlate all usage records created by a specific call as it is transmitted through a communications network. The compilation and correlation of usage records is achieved by assigning a unique identifier to each call within a communications network and propagating the identification to all network resources used within the call. Compilation and correlation of records is accomplished within a short time after the termination of the event. The compiled resource-usage records are translated into a record that may be centrally archived and that accurately reflects customers' use of network resources. This record may then be accessed by further systems, such as billing and network traffic control.

An advantage of the invention is that it provides a translation process that may be easily modified, updated, or customized based upon specific customer profiles as well as programs or offerings of the network service provider.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram of a prior art telecommunications network.

FIG. **2** is a representation of telephone call information transmitted in the network of FIG. **1**.

FIG. **3** is a block diagram of a telecommunications network incorporating the principles of the present invention.

FIG. **4** is a representation of telephone call information transmitted in the telecommunications network of FIG. **3**.

FIG. **5** is a flow diagram which implements the process executed in the telecommunications network of FIG. **3**.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

In FIG. **1**, an originating user **101** dials a call through local exchange (LEC) **102** which, in turn, routes the call to an originating switch **103** within the communications network. LEC **102** typically also forwards a minimum of call information to the switch **103**. The call information, as shown in FIG. **2**, consists of a dialed number and the ANI (automatic number identification) of the calling telephone. The call is then routed from originating switch **103**, through a variable number of intermediate switchpoints **104**, to a terminating switch **105**, and further to the called site **106**. To accomplish the routing, originating switch **103** sends the call information to a central data base site **107** over an internal network connection. The central site then sends back routing instructions to switch **103**, as well as all switches **104**,**105** that are required to route the call. It does not, however, provide call information to switchpoints beyond the originating switch, and any reports of network usage must rely on records of call information and routing instructions maintained at the data base site. This architecture incurs a significant load on the facilities at the central site, especially if it is desired to create usage reports in real time.

An embodiment of the invention is shown in the communications network of FIG. **3**. Similarly to the procedure as described above, an originating user may dial a call through LEC **302** to a network site-of-origin **310** for a network. The LEC passes at least a minimum of call information to the network (dialed number and ANI).

As soon as a call is received by the network, it is labeled as a network event. It is assigned a unique call tag, which call tag is transmitted along the routing path of the event, from site-of-origin **310**, through all intermediate switches **311** to the destination switch **312**. Switches **310** and **312** need not be structurally different from intermediate switches **311**, and are labeled separately for convenience. At each site, a record is created of the event and placed in a local record store **321**, along with the associated call tag. A suitable format for the call tag is shown as part of a local record in FIG. **4** of the drawings. The call tag includes an off-hook time for the call; the terminating switch ID; the port number at the switch, and the sequence or customer number of the call.

The large number of records made available by network switches **310**–**312** are processed in a series of stages. The load of processing raw resource records is distributed among a number of real-time processors **323** by a data partitioner

stage 322. Each real-time processor 323 is designed to process the records generated by an event, and to output as complete a record of each event as possible within a determined time period of the termination of the event. Completed event records may be accessed by a variety of systems that require-continuous updating such as traffic statistic processors.

As the record is completed, or in case the determined time period expires without a complete record, information processed up to that time is forwarded to further systems represented in FIG. 3 as deferred event processing 325. As the name implies, deferred processing does not have the real-time constraints of real-time processors 323, although, in the case of an incomplete event record created by a real-time processor unit 323, deferred event processing may well directly act on raw resource data generated in the communication system. Deferred processing completes, reformats, and indexes information from real-time processors 323 and creates archivable records based on event information and tabular information supplied by other sources.

The communication network of FIG. 3 may well provide services other than POTS (plain old telephone service). In another embodiment, the network may be accessed by dedicated access terminals, as well as, packet-switched data sources based on other networks (303–305). Data from these packet-switched sources, although bypassing local exchange 302 may include routing information imbedded in the data, and represent another network event. Such data may be assigned a call tag. The call tag is propagated through the network to generate resource records in the same fashion-as described above.

It will be understood that the diagram of FIG. 3 represents only the routing path of a single representative network event. The network may include any number of switching sites and other resources, and that an incoming event may originate and terminate at any selected sites on the network.

FIG. 5 is a more detailed diagram of processing steps within a representative real-time processing node and the deferred event processing stage.

Raw resource data from switch-based data sources 501 and packet-based data sources 502 is partitioned in step 1 at data partitioning stage 522 among a number of real-time processing nodes. (In a system not designed to communicate a high volume of packet-based data from sources 502, it would be conceivable to directly assign data from switches 501 to associated real-time processing nodes.)

Partitioned raw records with associated call tags are captured from data partitioning stage 522 by capture stage 523 in step 2. Stage 523 is designed to handle all network protocol required by the real-time processing node, as well as to accept batched requests from other downstream sources (e.g. retransmission requests from the deferred processing stage).

In step 3, real-time event correlation stage 524 accepts individual records from capture stage 523 and, based on the associated call tags, combines them into a single record that preferably provides an end-to-end view of the event. High-speed matching of records with the same call tag value is carried out either until all expected records have been combined, or until a certain time-out period (e.g. 30 minutes) has passed since the last known event record has been created. In step 4, complete and incomplete records are both sent downstream to stage 525. Stage 525 accepts records compiled within real-time correlation stage 524 and creates a standard record of a form used throughout the remainder of system. Preferably, the standard record has the properties that:

- A single field has a single meaning (unlike call-tagged resource records).
- Individual fields from prior records are collected and grouped into physical segments within the standard record.
- Fields within the output record are byte-aligned into character and binary numerical fields.

Matched data is also made available to systems requiring continuous updating such as real-time statistical data reduction stage 527 in step 5. The output of stage 527 may be used to monitor traffic on the communications network.

After a standard record of an event has been created, it may be augmented with additional information. The augmenting information must be contained within the limited resources of a real-time processing node without continuous updating from a central data base, and therefore must be relatively time-stable. For example, a customer's name and address may well not be stable between the time of receipt of an event and the time the account is billed, and thus would not be included. In a preferred method, the augmenting information (possibly any necessary control information as well) is updated from a central reference file at least once per day.

Before the standard record exits real-time processing, it is advantageous in a step 6 to combine the record information with pricing information 526 (as supplied by tariff tables). Pricing within the real-time processing node is limited to pricing of a single event, as summary or aggregate data is not available at the node. The priced and assembled standard records 526 may be made available to real-time processes (e.g. stage 527). The records are also passed to deferred processing.

In step 7, interim data store 528 is the first stage in deferred or non-real-time processing. In addition to record storage (preferably up to seven days' worth), stage 528 also compiles indices into the data and enables low-volume indexed retrieval. The preferred index fields are ANI, the digits dialed, the originating switch or port, terminating switch or port and sequence or customer number. Any other desired fields may be selected. In the preferred system, records are processed through the real-time processor 323 (see FIG. 3) and are retrievable through an index within seconds of being captured at stage 523.

In step 8, deferred event correlation stage 529 accepts data from interim data store 528. The step acts as a safety net in case real-time correlation stage 524 is not able to compile/match all records for a given event within the time-out period. The time-out period for the deferred event correlator is very long (e.g. 90 days). The deferred event correlator also has a function of detecting gaps in the reported list of switch records. If a gap is detected, stage 529 sends a retransmission request to the capture stage 523 which in turn requests retransmission of data from the targeted network resource.

From the deferred event correlator 529, data is passed into archival storage 530, in a step 929. Preferably, archival storage 530 is hierarchical in structure, based on frequency of use. Records are grouped by attribute (e.g. switch number, customer group, product group). Archival storage 530 is designed to be accessed by client processes such as billing, and thus preferably includes controls to insure one-time-only retrieval of any given data by selected clients. In the preferred system, archival data is available within a few hours after related records have been captured at stage 523.

The communications network embodying the invention is thus able to track any event on the network through all the

system resources involved, and provides an end-to-end record, including pricing, of the entire event. The operator of the network is able to generate billing and summary information that accurately reflects customers' use of network resources and is easily able to update, modify, or customize network service based on any desired diverse types of pricing and billing information for customer use of the network.

The foregoing description represents the overall operative method of a preferred embodiment of the invention. It will be recognized by those of ordinary skill in the art that various modifications may be made without departure from the concepts inherent in the invention.

We claim:

1. In a telecommunications network, a system for automatically, in real-time, creating and maintaining records of customer use of the network for diverse types of service and costs, comprising:

a) means for initiating diverse types of service at different costs for customer use on the network;

b) means for labeling each customer unit an event and assigning a tag to each event;

c) means for transmitting the event through at least one switching device in the network;

d) means for creating at each switching device a record of each event;

e) means for distributing the stored records to at least one processor; and

f) means for generating a record of events for each customer use within a determined time period of the termination of the event.

2. The system of claim 1 further including means for storing the record at each switching device.

3. The system of claim 2 further including means for deferred processing the records stored at the switching devices.

4. The system of claim 3 wherein the tag includes index fields for compiling indices from data represented in the fields for data retrieval purposes.

5. The system of claim 4 wherein each record includes field having a single meaning; individual fields from prior records are collected and grouped into physical segments within the record, and when outputted fields are byte-aligned into character and binary numerical fields.

6. The system of claim 5 wherein the event may be telephone call or packet data originated.

7. In a telecommunications network, a method for automatically, in real-time, creating and maintaining records of customer use of the network for diverse types of service and costs, comprising the steps of:

a) collecting and tagging customer use of the network as an event;

b) forming a record of each event at each switching device in the network;

c) partitioning and capturing all records and associated tags;

d) performing real-time event correlation based upon call tags and combining them into a single record;

e) matching records with the same call tag after real-time event correlation to form standard records; and

f) incorporating additional information into the standard record as a basis for billing the customer for use of the diverse types of services and costs on the network.

8. The method of claim 7 further including the steps of:

i) storing on a interim basis the standard records and compiling indices;

ii) compiling and matching the stored standard records for a given event within a predetermined time period;

iii) archiving the compiled and matched standard records for business purposes related to the network.

9. The method of claim 8 wherein the compiling and matching the stored standard record further includes the step of:

i) detecting missing information in the stored records and requesting a retransmission of data from the above partitioning and capture step.

10. The method of claim 7 further including the step of:

i) supplying pricing, tax and pricing information as additional information for billing customer use of the network.

* * * * *

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION**

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff, v. OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation, Defendants.	Case No. 1:10-CV-910 (LMB/TRJ) **JURY TRIAL DEMANDED**

DECLARATION OF MICHAEL SHAMOS

I, Michael Shamos, hereby declare as follows:

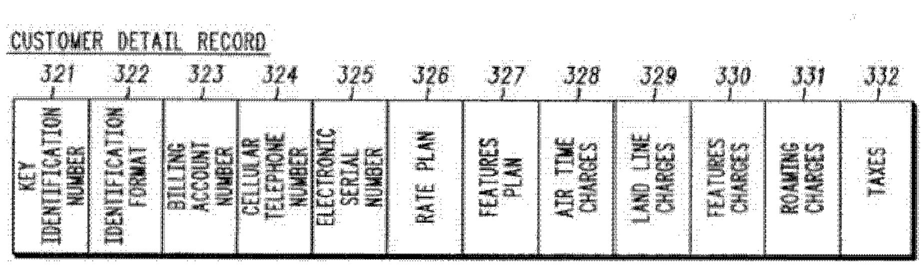
1. I am submitting this declaration in support of Openet's Opposition to Amdocs' Motion for Proposed Claim Constructions and Partial Summary Judgment of No Invalidity and No Inequitable Conduct. I have been retained on behalf of Openet as a technical expert. I have submitted expert reports on the invalidity and non-infringement of the patents-in-suit, and I was deposed by counsel for Amdocs in May 2011.

2. By way of background, I currently hold the title of Distinguished Career Professor in the School of Computer Science at Carnegie Mellon University. I hold a Ph.D. in Computer Science from Yale University. Between 1979 and 1987, I founded two software companies in Pittsburgh, PA. I also hold a law degree and am admitted to practice before the United States Patent and Trademark Office.

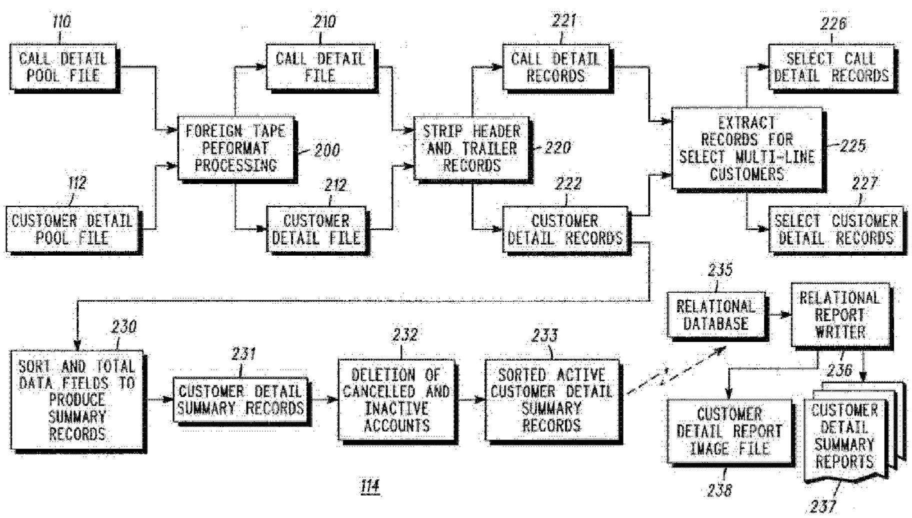
3. Amdocs and its expert, Dr. Ellen Zegura, attempt to draw a distinction between billing for telephone services and billing for Internet services. The way they present things, all a telephone company had to do to bill for a call was to know (a) the

calling number, (b) the called number and (c) the duration of the call. It may have been true at some point in the distant past that these three pieces information would have been sufficient to compute a bill – for example, if all the telephone lines in a network were owned and controlled by a single entity. However, the advent of AT&T's packet-switched Signaling System No. 7 (SS7) in 1980 and cellular services during the 1980s greatly complicated telephone billing. Further, with the proliferation of carriers following the breakup of AT&T in 1982 and subsequent deregulation, even a single telephone call may have traveled across networks and switches maintained by multiple carriers and generated disparate records that needed to be collected and analyzed to produce a bill. Moreover, telephone companies transitioned over time from offering only voice services, then to both voice and data over ISDN, then to a multiplicity of data services, including packet-switched services.

4. Prior art U.S. Patent 4,979,207 ("the '207 patent"), attached hereto as Exhibit 1, detailed some of the complexities of telephone billing in 1990, which had to incorporate air time charges, landline charges, feature charges, roaming charges, and taxes. Col. 2:66-68. The prior art '207 patent addresses several problems, including preparing a single bill for a customer who has many telephone lines, reformatting call data from a variety of roaming providers. All of the charges for a given customer are accumulated into a single record 302, which is shown in Fig. 4 below:



5. The prior art '207 patent also discloses identifying services (at least to the extent that term can be understood) because it is able to charge different amounts for different services; collecting data describing the services (e.g. the amount if service that was rendered); a plurality of services (as listed above); and a single billing record. It also discloses enhancing the detail records by adding field data such as that shown in 321, 322, 323, 325, 326 and 327 in Fig. 4, above; correlating accounting records, as shown in blocks 225 and 230 of Fig. 2, below, and using the correlated records to enhance the record shown in Fig. 4, above. Thus, these processes were not unique to the patents-in-suit or even to certain network types, such as packet-based networks.



6. Network service providers were providing a wide variety of packet-switched services long before the filing of the patents-in-suit. By 1978, almost 20 years before the filing of the '065 Patent, Dr. Lawrence Roberts, one of the inventors of packet switching, had written a historical summary of packet-switched networks, including such

public networks as Tymnet (1960), Telenet (1975), DATAPAC (1977), and TRANSPAC (1978) (years in parentheses reflect the dates in which the networks became operational).[1]

7. The OSI packet network model discussed by Amdocs and Dr. Zegura is so old that AT&T's SS7 in 1980 was based on it. Even earlier, however, a widespread packet-switching protocol named X.25 was in use. It was developed by the International Telegraph and Telephone Consultative Committee (CCITT) in 1974-1975 and adopted in 1976 because packet-switched networks were proliferating and standards were needed to ensure interoperability among networks. Among the public X.25 networks operating during the 1980s and 1990s were Compuserve, Euronet and PSS.

8. Indeed, the problem of billing for packet-switched network services was sufficiently important that the CCITT[2] issued Recommendation D.11 in 1991 entitled "Special Tariff Principles for International Packet-Switched Public Data Communication Services by Means of the Virtual Call Facility."[3] It states that the following types of packets should be chargeable: data packet, interrupt packet, call request/call incoming packet, reset request/reset indication packet and clear request packet. It further recommends that charging should be based on both "value of information transmitted and duration of communication." Thus, many years before the patents-in-suit, the problem of billing separately for different types of packets was known and had been solved.

---

[1] Roberts, Lawrence G., "The Evolution of Packet Switching." November 1978. Available at http://www.packet.cc/files/ev-packet-sw.html

[2] The International Telegraph and Telephone Consultative Committee (CCITT) was the standard-setting body of the International Telecommunications Union.

[3] Available at http://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-D.11-199103-I!!PDF-E&type=items.

9. Further, the first commercial Internet service providers (ISPs) were formed in the late 1980, including PSINet, UUNET, Netcom, and Portal. This was before the Internet was opened up to general public use, but these companies provided billed services to research networks and offered email services to the public. The first telephone dial-up ISP, world.std.com, started in 1989.

10. Therefore, any suggestion by Amdocs or Dr. Zegura that the billing problems faced by the inventors in this case were new at the time the patents-in-suit were filed is erroneous. Developments in telecommunications technology led to more records being generated, but this increase in records to process was accompanied by an increase in computing power and memory, and the fundamental billing process did not change.

I declare, subject to the penalty of perjury of the laws of the United States of America, that the foregoing is to the best of my knowledge true and correct.

Date: June 15, 2011

Michael Ian Shamos

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION**

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff, v. OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation, Defendants.	Case No. 1:10-CV-910 (LMB/TRJ) **JURY TRIAL DEMANDED**

DECLARATION OF PATRICK McDANIEL

I, Patrick McDaniel, hereby declare as follows:

1. I am submitting this declaration in support of Openet's Opposition to Amdocs' Motion for Proposed Claim Constructions and Partial Summary Judgment of No Invalidity and No Inequitable Conduct. I have been retained on behalf of Openet as a technical expert. I have submitted expert reports on the invalidity and non-infringement of the patents-in-suit, and I was deposed by counsel for Amdocs in May 2011.

2. By way of background, I am Professor of Computer Science and Engineering at The Pennsylvania State University. Before joining the Penn State faculty I worked at AT&T Research in Florham Park, New Jersey. Early in my career I worked as a developer for a small software company that provided network management software to telecommunications companies such as MCI, AT&T, and McCaw Cellular. I hold a Ph.D. in Computer Science from the University of Michigan.

3. I disagree with Amdocs' assertion that the telephony call detail record (CDR) billing process was relatively simple. Whether done of over circuit-switched

networks or packet-switched networks, mediating network records to generate a bill is and has been one of the most complex tasks in the field of network management. Generating a bill requires processing records from the different services (e.g., voice, data) and other value added services (e.g., voicemail, email, video) provided over telecommunications networks. That was the case when the patents-in-suit were filed and remains the case today.

4. Also, mediating data records generated in circuit-switched networks is not fundamentally different than mediating data records generated in packet-based networks. In circuit-switched networks the data records typically represent the length of an event (e.g., length of phone call, length of data transmission), while in packet-based networks the data records typically represent the quantity of data transferred (e.g., an event lasting X minutes transmitted Y data packets, each consisting of Z data bytes). For a mediation system, however, both records are data (i.e., numeric quantities) that needs processed.

5. With respect to the claim term report, although reports can be generated by information retrieved from databases using queries, there are many ways to generate reports, including but not limited to queries to a database.

6. With respect to the claim term "plurality of layers," although the Open Systems Interconnection (OSI) model referenced in the patents-in-suit is a common networking model and contains multiple layers, there are other networking models that may differ from or not adhere to the OSI model.

I declare, subject to the penalty of perjury of the laws of the United States of America, that the foregoing is to the best of my knowledge true and correct.

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Pricing of Telecommunications Services

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Abstract. Recently many scholars have argued that society's welfare would be increased if the price of local telephone service were increased, and the prices for toll and enhanced telecommunication services reduced. In this paper we argue that the telecommunications policy literature has largely ignored the impact of varying technical standards on the cost-of-service. Consequently, the marginal cost of exchange service has been overstated. We also show that most work in this area has overstated the elasticity-of-demand for toll services. Taking into account quality and the appropriate elasticities, we conclude that no clear welfare gains will be achieved by raising the price of exchange service.

Key words. Public utilities, pricing, cost, regulation.

A number of economists have argued that society's welfare would be improved if the price of basic telephone service was raised and the price of toll and enhanced services were lowered. These authors believe that by reducing the price of usage and increasing the price of obtaining access to the network, prices will be set more on a cost-causative basis.[1] The Federal Communications Commission, finding these arguments persuasive, has approved increased customer access line charges (CALCs).[2]

In this paper we address the issue of the extent to which competitive market theory, as well as the optimal pricing literature, supports higher customer access line charges. The paper is broken into two parts. In the first section, we argue that the proponents of CALCs have mischaracterized the economic cost of providing customer access, as well as the appropriate pricing structure. In the second portion of the paper we evaluate the assertion that large welfare gains can be achieved by raising exchange and lowering toll rates.

I. Recovery of Joint and Common Costs

1. THE PRICE AND COST OF CUSTOMER ACCESS

Customers obtain access to the public switched network by obtaining exchange

service.[3] Residential customers typically pay a monthly fee which provides them with access, as well as an unlimited number of local calls. The customer access line charge is effectively included in the price of exchange service. Business exchange rates either have the same price structure, or customers pay a rate for access and a second charge which increases proportionately with usage.

Kahn and Shew, as well as others, argue that access costs are invariant to usage and, therefore, economic efficiency requires that these marginal costs be recovered through a fixed customer charge.[4]

Recently, this view was challenged by Dalton and Mann (1988). Dalton and Mann conducted a statistical examination of the alleged invariance of loop costs to usage. Using cross-sectional data, they found that access costs were correlated, to a statistically significant degree, with the volume of exchange and toll usage.

While Dalton and Mann's work is based on historical data, the engineering literature suggests that, due to the conversion of the network from analog to digital transmission, the costs of providing customer access will increasingly be a function of usage. Local exchange companies have decided to install only digital switches in the foreseeable future. With the potential synergies between digital loops and digital switching, the drop in the cost of digital circuits, and the growing data transmission requirements of certain customers, the economics of loop technology has changed. In the past, the customer loop connection to the central office was provided almost exclusively by a dedicated metallic pair of wires. In the future, the relevant long-run technology will include not only the dedicated pair of wires, but also the digital subscriber loop carrier systems that are known generically as 'pair-gain' equipment.

Pair-gain equipment provides for multiple 'talk paths' over one pair of wires (or equivalent) between the pair-gain equipment and the central office. Thus the number of pairs of wires (or equivalent) required between these two points is reduced. The amount of pair-gain equipment that must be installed is partly a function of customer *peak-hour* usage volume.[5] Whereas some of the cost of access is a function of usage, economic theory does not support the movement to recover these costs through a fixed customer charge.

The engineering literature suggests that the development of the digital network has increased the extent to which loop costs are traffic-sensitive. But pair gain equipment is only used to provide service to customers who are located far from the central office. For the majority of subscribers, a dedicated pair of wires is still the cost minimizing technology. Furthermore, for customers served by pair-gain equipment, there are still customer specific investments which are independent of the level of usage. Should these access costs, as Kahn and Shew argue, be recovered exclusively through a fixed customer charge?

That proposition is reasonable if one believes, as do the proponents of customer access line charges, that access is a service. This belief is easily refuted by noting that an access line is a joint input, because it conveys in fixed proportions the

ability to place and receive local and toll calls. That is, an access line is an input to two final products: local and toll calling. From the consumer's perspective the output of the firm is usage. While access has an identifiable cost, this input is not something valued by customers by and unto itself. An access line is installed because it is a facility required for originating and terminating local and toll calls.

2. RECOVERING THE COST OF A JOINT GOOD

Advocates of CALCs state that customer access is a service because "many would be willing to pay for the *opportunity*"[6] (original emphasis) to place or receive calls. We argue that access is a joint input which provides the ability to place or receive local and toll calls.[7] The difference is not semantic.[8] If access is not a separate service, but is, in fact, a joint input, efficient recovery of the cost of access should be based on the demand for the services using the input.

Others argue that even if access line costs are classified as a joint cost, it is still the case that they are non-traffic sensitive costs and should therefore be recovered through a fixed customer payment.[9] While compelling on its face, we do not believe that the government's power should be used to enforce a singular price structure.

Some of the non-traffic sensitive costs should be recovered through charges to toll carriers,[10] and these suppliers can then choose the method which they find optimal for recouping these costs. Just as firms in competitive industries offer their customers various pricing options (e.g. the racquetball clubs that charge higher usage rate for non-members), so will the multiple toll suppliers be compelled to offer customers various options.[11]

3. THE COST IMPACT OF DESIGNING THE NETWORK FOR TOLL, DIGITAL AND ENHANCED SERVICES

Identifying and recovering the joint costs of providing telephone service is becoming increasingly complicated as local telephone companies (LECs) upgrade their access and local switching facilities so that they can improve their marketing of enhanced services (e.g. digital centrex service, custom calling services, and integrated broadband networks).[12]

Kahn and Shew argue that the marginal cost of a service is the cost of expanding output on a network that has been designed to minimize the total cost of providing all services.[13] In practice, this means calculating expansion costs after the choice of technology has been made.

We have two concerns about this approach. First, the analysis does not address the incentives faced by exchange carriers. Investment can be used as an entry deterrent. An effective deterrence may be the selection of facilities that have associated with them high fixed costs and low variable costs Dixit (1982).

Table I. Incremental cost of service: 70,508 customers

	Digital	Analog	Ratio
Incremental cost Exchange busy-hour CCS[1]	6.72 (2.96)	8.29 (3.67)	0.81
Incremental cost Toll busy-hour CCS	14.29 (4.66)	29.64 (6.35)	0.48
Incremental cost Local private line	135.26 (31.97)	157.76 (54.30)	0.86
Incremental cost Toll private line	340.69 (85.87)	243.92 (56.45)	1.40
Incremental cost Switch access line (loop)	87.81 (8.17)	71.84 (9.97)	1.22
Number of customers	70,508	70,508	1
Square miles	31.69	31.69	–

$n = 11$ for each cell.
Standard deviation in parentheses.

In a sense, today's digital switching machines have this cost structure. Once a customer is connected to the switch, the cost of usage is low. But the new technology raises the cost of connecting customers to the network. Consequently, the adoption of technology raises the cost of access, a service subject to little potential competition due to municipal and state regulations, and lowers the cost-of-service for competitive services.

Second, the methodology is not consistent with economic theory. Faulhaber provides the following definition of the incremental cost of providing a service: Where facilities are shared by two or more services, the incremental cost of service B is the difference between the cost of providing service A on a stand-alone basis, and the cost of providing service A and B through the same network.[14]

We pointed out above that the replacement of analog with digital technology improves the local exchange companies' ability to market enhanced voice, high-speed data, and video services. Tables I–VII provide data on the incremental cost of service under the assumption that either digital or analog technology is deployed. The data were generated by an optimization model that we constructed. The model determines the cost minimizing network configuration for a local exchange carrier. The carrier offers four services, switched exchange and toll, as well as exchange and toll private line services. The toll costs identified in the model are limited to the local exchange company's costs (i.e., they do not include intercity transport costs).

Using the downhill-simplex method,[15] the optimization model determines the number of switches, and their locations, that minimize the annual cost of providing

Table II. Incremental cost of service: 56,420 customers

	Digital	Analog	Ratio
Incremental cost	1.53	3.57	0.43
Exchange busy-hour CCS	(0.69)	(1.24)	
Incremental cost	13.28	22.85	0.58
Toll busy-hour CCS	(0.64)	(5.75)	
Incremental cost	137.22	116.07	1.18
Local private line	(28.90)	(33.21)	
Incremental cost	402.60	163.09	2.47
Toll private line	(145.12)	(77.29)	
Incremental cost	136	99.75	1.36
Switch access line (loop)	(1.79)	(3.12)	
Number of customers	56,420	56,420	1
Square miles	23.08	23.08	1

Standard deviation in parentheses.

Table III. Incremental cost of service: 212,040 customers

	Digital	Analog	Ratio
Incremental cost	8.68	7.28	1.19
Exchange busy-hour CCS	(2.13)	(3.46)	
Incremental cost	17.73	20.05	0.88
Toll busy-hour CCS	(6.91)	(6.77)	
Incremental cost	220.88	195.76	1.13
Local private line	(74.19)	(52.68)	
Incremental cost	291.00	234.92	1.24
Toll private line	(149.93)	(61.43)	
Incremental cost	177.97	107.08	1.66
Switch access line (loop)	(8.28)	(9.24)	
Number of customers	212,040	212,040	1
Square miles	62.02	62.02	1

service[16] in cities with varying number of customers, usage patters and customer density.[17]

Using the optimization model, we have estimated the incremental, annual cost of producing these four services, as well as the cost of access. The results are based on 1990 input prices and are reported for cities of different sizes.[18]

The data reported in the tables suggests that the introduction of digital technology raises the cost of access and private line services, and lowers the cost of switched usage.

Table IV. Incremental cost of service: 179,000 customers

	Digital	Analog	Ratio
Incremental cost Exchange busy-hour CCS	3.53 (1.00)	11.25 (2.78)	0.31
Incremental cost Toll busy-hour CCS	20.21 (7.74)	28.59 (8.96)	0.71
Incremental cost Local private line	151.51 (23.63)	129.74 (29.89)	1.17
Incremental cost Toll private line	360.86 (86.04)	193.67 (63.57)	1.86
Incremental cost Switch access line (loop)	112.69 (2.78)	51.12 (2.18)	2.20
Number of customers	179,000	179,000	1.0
Square miles	8.12	8.12	1.0

Table V. Incremental cost of service: 178,032 customers

	Digital	Analog	Ratio
Incremental cost Exchange busy-hour CCS	4.74 (1.11)	9.15 (3.46)	0.52
Incremental cost Toll busy-hour CCS	20.77 (3.69)	23.97 (5.13)	0.87
Incremental cost Local private line	210.89 (12.40)	172.59 (26.50)	1.22
Incremental cost Toll private line	354.47 (32.94)	217.04 (40.90)	1.63
Incremental cost Switch access line (loop)	83.75 (3.34)	74.12 (10.15)	1.13
Number of customers	178,032	178,032	1.0
Square miles	43.94	43.94	1.0

The cost of private line services increases because on interoffice routes, these services no longer share terminating equipment with switched services. Consequently, the lumpy investments are no longer shared by as many customers. Furthermore, in today's digital environment, carriers are only installing digital interoffice trunks, even though analog, copper trunks may be the cost minimizing technology for many private line interoffice trunks.

The cost of terminating an access line increases because the line termination equipment on a digital switching machine handles many functions that were previously the function of interoffice trunking equipment and the central processor unit of the switching machine.[19] Because the access line termination equipment handles these functions, the cost of usage declines.

Table VI. Incremental cost of service: 70,508 customers

	Digital	Analog	Ratio
Incremental cost	3.78	2.31	1.64
Exchange busy-hour CCS	(3.28)	(0.01)	
Incremental cost	13.75	19.46	0.71
Toll busy-hour CCS	(4.43)	(0.07)	
Incremental cost	67.48	49.17	1.37
Local private line	(27.71)	(6.98)	
Incremental cost	328.75	197.61	1.66
Toll private line	(89.09)	(28.13)	
Incremental cost	70.33	42.60	1.65
Switch access line (loop)	(9.71)	(0.19)	
Number of customers	70,508	70,508	1.0
Square miles	3.59	3.59	1.0

Table VII. Incremental cost of service: 154,972 customers

	Digital	Analog	Ratio
Incremental cost	9.22	12.48	.74
Exchange busy-hour CCS	(4.61)	(0.78)	
Incremental cost	20.34	25.51	0.80
Toll busy-hour CCS	(4.32)	(3.27)	
Incremental cost	141.11	159.75	0.89
Local private line	(43.60)	(28.51)	
Incremental cost	314.11	225.28	1.39
Toll private line	(85.64)	(44.71)	
Incremental cost	127.44	74.46	1.71
Switch access line (loop)	(13.21)	(2.26)	
Square miles	31.69	31.69	1.0

1. One CCS = one hundred calling seconds.

Table I through Table VII indicate the degree to which exchange rates would increase if Kahn and Shew's cost methodology is adopted. For example, in an urban community, during the busiest hour of the day, the average use of a line is approximately 312 seconds.[20] Table IV suggests that if price was set equal to the marginal cost of production, the introduction of digital technology would increase the price of exchange service by $37.49 per annum.[21] Despite the rate increase, there would be little or no change in the quality of voice exchange service.

The more exacting technical requirements of toll and enhanced services are properly classified as joint costs.[22] Economically efficient pricing requires that the joint costs of upgrading the network not be assigned exclusively to exchange service.[23] To do as Kahn and Shew and others advocate would result in having

the consumers of the least technically demanding service, exchange service, pay the costs incurred for the provision of the most demanding service. This violates the basic economic tenet that the binding constraint, not the slack constraint, is responsible for costs incurred at the margin.

II. Optimal Departures from Marginal Cost Pricing – The Second-Best Case

1. WELFARE GAINS FROM INCREASED CUSTOMER ACCESS LINE CHARGES

The Federal Communications Commission has embraced the position that the cost of an access line should be recovered through a fixed monthly charge to end-users. They believe that this will lead to a significant improvement in society's welfare.[24] In this portion of the paper we will evaluate the empirical data that is cited as support for this claimed welfare gain.

Lewis Perl has shown that the claimed welfare gains are quite sensitive to the assumed level of marginal cost and the elasticity of demand:[25]

Social welfare benefits from cost-based pricing: pricing different toll costs and elasticities

	Likely elasticity (−0.65)	High elasticity (−0.9)	Low elasticity (−0.35)
Toll costs (Billions of Dollars)			
8–10 cents	5.53	9.66	2.86
13–15 cents	2.60	4.13	1.49

In reporting his results, Dr. Perl points out that "the variations of the results clearly suggests that they are very sensitive to demand elasticities and costs within the plausible range".[26] The welfare estimates are sensitive to the value of these parameters because the objective of a Ramsey (second-best) pricing is to minimize departures from marginal cost pricing. The higher the elasticity of demand for a service, *ceteris paribus*, the larger the welfare loss resulting from price diverging from marginal cost.

Perl, Brock and others have obtained their estimates of the elasticity of demand for toll service from Lester Taylor's *Telecommunications Demand: A Survey and Critique* (1980). In chapter five of the book, Taylor provides estimates of the price elasticity for both interstate and intrastate services: −0.75 and −0.65 respectively.[27]

Taylor expressed his concern that many of the empirical models that he relied on in making his estimates might suffer from aggregation bias. Only one of the models that Taylor reviewed, prior to his writing of chapter five, explicitly considers such variables as length-of-haul, customer classes, time-of-day, and types of call (person-to-person and station-to-station). Most models, especially those developed to estimate the demand for intrastate service, only explicitly measure the demand for the aggregate good 'toll service'.[28]

The disaggregated, long distance interstate (LDI) model suggested a demand elasticity of between −0.4 and −0.5 for a typical long-distance interstate call. The other interstate aggregate model, reviewed by Taylor, suggested a point estimate of demand elasticity of −1.03. Taylor apparently took the average of these two elasticities to arrive at the −0.75 estimate.

After Taylor completed chapter five, his study was circulated within the Bell Systems. During this review period, Taylor obtained two additional demand studies for interstate service. The results of these studies are presented in Taylor's postscript chapter. One model, RES, provides an estimate of the aggregate price elasticity in the range of −0.4 to −0.65. The second model described in Taylor's postscript, the FIRM model, suggests that the interstate toll price elasticity is −0.17.[29] Taking the arithmetic average of the two models in chapter five of Taylor's book, as well as the two models in the postscript, suggests an average price elasticity of −0.52, or approximately one-third of the value used by Brock and Perl in their studies.[30]

After presenting the results from the RES model, one which Taylor considers 'highly disaggregated', Taylor writes that:

> an obvious question is whether concentration on aggregate data results in estimates of the aggregate price elasticity for long-distance calls that are biased upward. This question needs to be investigated.[31]

Despite this warning by Taylor, Brock, Kahn and Shew, and Perl have continued to employ data in their models and papers that reflect this possible bias.

This bias problem is not limited to the estimates of demand for interstate toll service. Most of the intrastate toll models are also done at the aggregate level. In general, no effort is made to explicitly identify such factors as time-of-day pricing, and length-of-haul.[32]

There is a second problem with the demand models that leads to estimates of the price elasticity that may be biased upward. Taylor states that the demand for intrastate toll service is typically modeled as a function of income, the size of the market, the real price of toll service, and the value of the lagged dependent variable.[33] The models exclude changes in preferences. When this factor is excluded from telephone time-series demand models, biased estimates will likely result.

Consider the following figures. Figure 1 is drawn under the assumption that there is no change in taste over the length of the time series. Figure 2 corrects for this omission.

Clearly the specification underlying Figure 1 will provide a higher estimate of the price elasticity of demand than the model associated with Figure 2.

Both the LDI model and the FIRM model controlled for changes in tastes by including growth as a right-hand-side variable. The parameter estimates from the LDI model suggest that the pure growth rate is approximately ten percent per

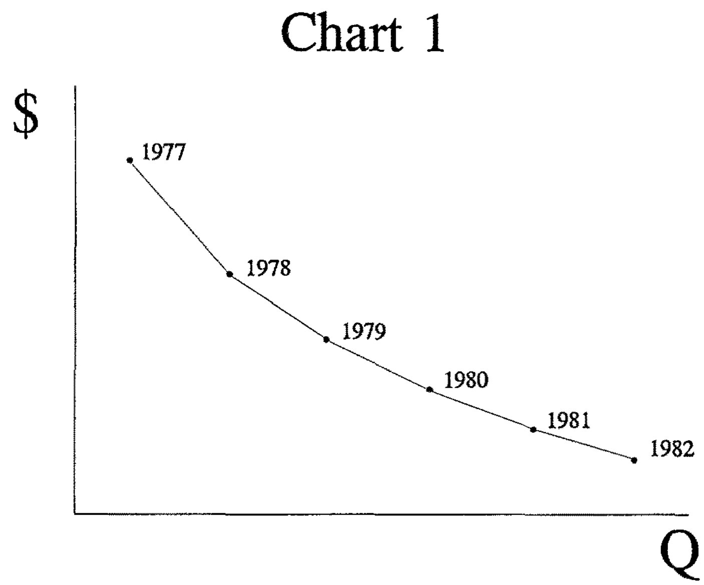

Fig. 1.

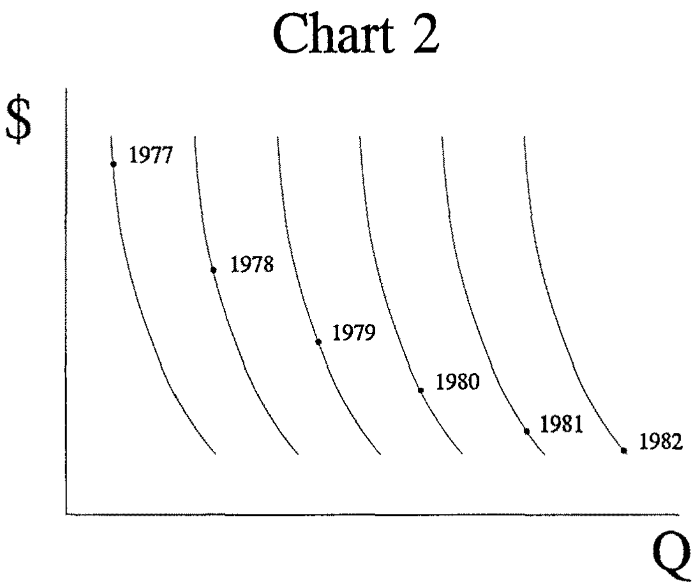

Fig. 2.

annum for LDI service.[34] When this autonomous growth is excluded from a model, its effect may be picked up in the price term because of the correlation between growth in demand for toll service, independent of price, income and market size, and the real price of toll service.

Unfortunately most empirical work has been based on the poor theoretical reasoning of the type shown in Figure 1. Consequently, the toll elasticity estimates

used by Kahn and Shew, Brock, Griffin and others are likely biased upward, and if that is the case, the claimed welfare gains from increased exchange rates are overstated.

Conclusion

In this paper we have shown that the economic case for higher basic monthly rates is not 'extremely compelling,' despite its advocates' claim.[35] Our reading of the economic and engineering literature leads us to conclude that:

(1) Due to the introduction of pair-gain technology, the access line should be considered partly traffic sensitive;
(2) Many of the costs associated with the modernizing of the network for toll and enhanced services are properly classified as joint costs;
(3) An access line is a joint good, and as such, the cost should be recovered from exchange and toll, as well as enhanced services;
(4) Recovery of customer access costs exclusively through an end-user charge would not be sustainable in a competitive market; and,
(5) Whereas one goal of regulation is to "emulat[e] the results that would in unregulated markets be produced by effective competition",[36] regulatory authority should not be used to require the recovery of customer access costs exclusively through end-user charges.

Notes

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[1] See, for example, Kahn and Shew (1987); Wenders (1987); Perl (1986); Brock (1984); and Griffin (1982).

While the presentation varies across authors, our comments will focus on Kahn and Shew's work since, of the authors cited in the previous paragraph, they have the most extensive discussion of the pricing of telecommunication services.

[2] Federal Communications Commission, Third Report and Order, CC Docket No. 78-72, Phase I, December 22, 1982.

[3] Functionally, access is the physical link between a customer's location and a switch at a nearby central office.

[4] Kahn and Shew (1987), pp. 202, 251.

[5] Cho, Olson, and Williamson (1982), pp. 2679, 2691; McRoy et al. (1984) p. 2418; Caniff (1981) p. 124.

[6] Kahn and Shew (1987), p. 201.

[7] In the next section we expand this analysis to include the treatment of enhanced services.

[8] The difference is similar in spirit to Pigou's and Taussig's disagreement over whether a railroad system provided a homogeneous product, transport (i.e. access), or two or more products, transport of coal and transport of copper (local and toll access) (1913).

[9] See, for example, Kahn and Shew, p. 201.

[10] The charge would reflect the opportunity cost to toll companies of being able to transport its traffic over the same facilities used for local traffic. Opportunity cost may be defined as "What the most insistent excluded customers would have been willing to pay" for the commodity. Kahn (1970) 1:85.

[11] Scotchmer (1985) has shown how as the number of suppliers in a market increases (i.e. the degree of competition increases), customer access fees converge to zero.

The carriers' advocacy of recovery of customer access costs exclusively through fixed customer line charges fits into Stigler's (1971) and Posner's (1974) description of the regulatory process where firms turn to the state to obtain (cartel) goals that are difficult to achieve without government intervention.

[12] Gabel (1990).

Many of these services are made possible through software upgrades. It is difficult to determine which services are responsible for the cost of the software.

[13] Kahn and Shew (1987), pp. 228–29.

[14] Faulhaber (1975), p. 969.

[15] Press et al. (1986).

[16] This is equivalent to minimizing the present worth of capital, maintenance and tax expenditures. Friedentfelds (1978), p. 821.

[17] For a fuller description of the model, see Gabel and Kennet (1991).

[18] Each cell of the tables were calculated based on eleven estimates of the incremental cost-of-service. The standard deviation of each parameter is reported in parenthesis.

[19] A multiproduct firm, such as a telephone company, is often able to provide a number of services at a lower cost than if each product was produced by different companies. A major source of these economies of scope is cost complementarities, that is, "that the marginal cost of producing any one product decreases. . . with increases in the quantities of other products." Baumol, Panzar, and Willig (1982), pp. 74–75.

'Access service' does not exhibit this property. The marketing of digital services on the same network used for exchange voice service raises the marginal cost of access. If there was a product such as access service, there would be an economic incentive for access to be provided on a stand-alone basis unless none of the additional cost of access was included in the price of access.

[20] The average use in suburban community and rural community is approximately 4.5 and 3.5 min respectively Skoog (1980).

[21] $[112.69 + 3.53 * 3.12 - 51.12 + 11.25 * 3.12] = 37.48$.

[22] J. Sickler addressed this issue fifty years ago (1928), p. 177:

> The grade of service demanded by the most exacting user thus must be partially applied to the entire system. If this user paid the full costs of his service, he would pay all the expense incident to providing over the whole system the extra grade of service he alone demands. Subscribers who evaluate this service at less than its cost, and thus do not demand it, are not primarily responsible for the incurance of the expense of its provisions. They are only responsible for the cost of the grade of service which they want.
>
> . . . [Customers with less exacting technical requirements] are willing to pay something for the better service and those who demand it need not pay its full costs. The costs of providing the higher grades of service are thus seen to be joint costs.

[23] Spence (1975).

[24] Brock (1984); and Federal Communications Commission, Third Report and Order, CC Docket No. 78-72, Phase I, December 22, 1982.

[25] Perl (1986), p. 18.

[26] Perl (1985), p. 15.

[27] Taylor (1980), pp. 169–70.

[28] Taylor (1980), pp. 97, 101, and 120.

[29] Taylor (1980), pp. 185–87.

[30] See, for example, Brock (1984), p. 35–36; and Perl (1986), p. 8.

[31] Taylor (1980), p. 186.

[32] Taylor (1980), p. 120.

[33] Taylor (1980), p. 120.

[34] Taylor (1980), pp. 106, 187. The pure growth is due, for example, to the growth of the information economy.
[35] Kahn and Shew (1987), p. 243.
[36] Kahn and Shew (1987), p. 207.

References

Baumol, William J., John C. Panzar, and Robert D. Willig (1982) *Contestable Markets and the Theory of Industry Structure*, New York: Harcourt Brace Jovanovich, Inc.

Brock, Gerald W. (1984) 'Bypass of the Local Exchange: A Quantitative Assessment', Federal Communications Office of Plans and Policy Working Paper Series.

Cho, Y-S, J. W. Olson, and D. H. Williamson (1982) 'The SLC-96 System', *Bell System Technical Journal* **61**, 2677–2702.

Caniff, R. J. (1981) 'A Digital Concentrator for SLC-96 System', *Bell System Technical Journal* **60**, 121–58.

Dalton, Margaret M., and Patrick C. Mann, (1988) 'Telephone Cost Allocation: Testing the Variability of Costs', *Land Economics* **64**, 296–305.

Dixit, Avinash (1982) 'Recent Developments in Oligopoly Theory', *American Economic Review: Papers and Proceedings* **72**, 12–15.

Faulhaber, Gerald R. (1975) 'Cross-Subsidization: Pricing in Public Enterprises', *American Economic Review* **65**, 966–77.

Freidenfelds, J. (1978) 'A Simple Model for Studying Feeder Capacity Expansion', *Bell System Technical Journal* **57**, 807–24.

Gabel, David (1990) 'Divestiture, Spin-Offs, and Technological Change in the Telecommunications Industry – A Property Rights Analysis', *Harvard Journal of Law and Technology* **3**, 75–102.

Gabel, David, and Mark Kennet (1991) 'Estimating the Cost Structure of the Local Telephone Exchange Network', National Regulatory Research Institute.

Griffin, James (1982) 'The Welfare Implications of Externalities and Price Elasticities for Telecommunications Pricing', *Review of Economics and Statistics* **64**, 59–66.

Kahn, Alfred E. (1970) *The Economics of Regulation: Principles and Institutions*, New York: John Wiley and Sons, Inc.

Kahn, Alfred E., and William Shew (1987) 'Current Issues in Telecommunications Regulation: Pricing', *Yale Journal on Regulation* **4**, 191–256.

McRoy, S. A., J. A. Miller, J. B. Truesdale, and R. F. Van Slooten (1984) 'Integration With the 5ESS Switching System', 63 *AT&T Bell Laboratories Technical Journal* 2417–2437.

Perl, Lewis (1985) 'Social Welfare and Distributional Consequences of Cost-Based Telephone Pricing', Presented at the Thirteenth Annual Telecommunications Policy Research Conference.

Perl, Lewis (1986) 'Welfare Gains From Cost-Based Telephone Pricing', National Economic Research Associates.

Posner, Richard A. (1974) 'Theories of Economic Regulation', *Bell Journal of Economics and Management Science* **5**, 335–358.

Press, William H., Brian P. Flannery, Saul A. Teukolsky, and William T. Vetterling (1986) *Numerical Recipes: The Art of Scientific Computing*, Cambridge University Press.

Scotchmer, Suzanne (1985) 'Two-Tier Pricing of Shared Facilities in a Free-Entry Equilibrium', *Rand Journal of Economics* **16**, 456–472.

Sickler, Barclay J. (1928) 'A Theory of Telephone Rates', *Journal of Land and Public Utility Economics* **4**, 175–188.

Skoog, R. A., (1980) 'Design and Cost Characteristics of Telecommunication Networks', Defendants Exhibit 2059 in United States v. American Telephone and Telegraph, Co.

Spence, Michael (1975) 'Monopoly, Quality and Regulation', *Bell Journal of Economics* **6**, 417–29.

Stigler, George J. (1971) 'The Theory of Economic Regulation', *Bell Journal of Economics and Management Science* **2**, 3–21.

Taussig, Frank W., and A. C. Pigou (1913) 'Railway Rates and Joint Costs', *Quarterly Journal of Economics* **27**, 378–84, 535–538, and 687–694.

Taylor, Lester (1980) *Telecommunications Demand: A Survey and Critique*, Cambridge, MA: Ballinger.

Wenders, John T. (1987) *The Economics of the Telecommunications: Theory and Policy*, Cambridge: Ballinger Publishing.

Charging and Rate Control for Elastic Traffic

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Abstract. This paper addresses the issues of charging, rate control and routing for a communication network carrying elastic traffic, such as an ATM network offering an available bit rate service. A model is described from which max-min fairness of rates emerges as a limiting special case; more generally, the charges users are prepared to pay influence their allocated rates. In the preferred version of the model, a user chooses the charge per unit time that the user will pay; thereafter the user's rate is determined by the network according to a proportional fairness criterion applied to the rate per unit charge. A system optimum is achieved when users' choices of charges and the network's choice of allocated rates are in equilibrium.

1. INTRODUCTION

This paper describes a model designed to shed light on the issues of charging, rate control and routing. Its main purpose is to support ongoing work on charging schemes for broadband multiservice networks, described in [3, 6]. A subsidiary aim is to investigate the relationship between various fairness criteria and "smart market" approaches to dynamic pricing [7, 9, 10].

The organization of the paper is as follows. Section 2 presents a system model of charging, routing and flow control, where the system comprises both users with utility functions and a network with capacity constraints. Standard results from the theory of convex optimization show that the optimization of the system may be decomposed into subsidiary optimization problems, one for each user and one for the network, by using price per unit flow as a Lagrange multiplier that mediates between the subsidiary problems. Low and Varaiya [7] and Murphy *et al.* [9] describe how such results may be used as the basis for distributed pricing algorithms, and MacKie-Mason and Varian [10] describe a "smart market" based on a per-packet charge when the network is congested.

In section 3 we use a simple example to explore how various fairness criteria are associated with particular choices of utility function. We note that max-min fairness [1] emerges as a limiting special case, and describe a proportional fairness criterion associated with the logarithmic utility function.

In the system decomposition of section 2, price per unit flow is the mediating variable. This may cause a particular difficulty for elastic traffic. In an implementation of an ATM available bit rate service, for example, users would be subject to *two* sources of uncertainty about the service offered: both the allocated rate *and* the price charged per unit flow would be allowed to fluctuate at the network's discretion. In section 4 we describe an alternative system decomposition where price *per unit share* is the mediating variable. Under this decomposition the user chooses the charge per unit time that it pays, and the network determines allocated rates by a proportional fairness criterion, but applied to the rate per unit charge, rather than just the rate. It is shown that a system optimum is achieved when users' choices of charges and the network's choice of allocated rates are in equilibrium.

2. THE MODEL

Consider a network with a set J of *resources*, and let C_j be the finite capacity of resource j, for $j \in J$. Let a *route* r be a non-empty subset of J, and write R for the set of possible routes. Set $A_{jr} = 1$ if $j \in r$, so that resource j lies on route r, and set $A_{jr} = 0$ otherwise. This defines a $0-1$ matrix $A = (A_{jr}, j \in J, r \in R)$. Suppose that several routes through the network may substitute for one another: formally, suppose that a *source-sink* s is a subset of R and write S for the set of possible source-sinks. Set $H_{sr} = 1$ if $r \in s$, so that route r serves the source-sink s, and set $H_{sr} = 0$ otherwise. This defines a $0-1$ matrix $H = (H_{sr}, s \in S, r \in R)$. For each $r \in R$ let $s(r)$ identify a value $s \in S$ such that $H_{sr} = 1$, and suppose this value is unique; we view $s(r)$ as the source-sink served by route r.

We associate a source-sink s with a user, and suppose that if a rate x_s is allocated to the source-sink s then this has utility $U_s(x_s)$ to the user. We assume that the utility $U_s(x_s)$ is an increasing, strictly concave and continuously

differentiable function of x_s over the range $x_s \geq 0$ (following Shenker [12], we call traffic that leads to such a utility function *elastic* traffic). Assume further that utilities are additive, so that the aggregate utility of rates $x = (x_s, s \in S)$ is $\sum_{s\in S} U_s(x_s)$.

A flow pattern $y = (y_r, r \in R)$ supports the rates $x = (x_s, s \in S)$ if $Hy = x$, so that the flows y_r over routes r serving the source-sink s sum to the rate x_s. A flow pattern $y = (y_r, r \in R)$ is feasible if $y \geq 0$ and $Ay \leq C$, where $C = (C_j, j \in J)$, so that the flows over routes through resource j sum to not more than the capacity C_j of resource j. Let $U = [U_s(\cdot), s \in S]$ and let $U'(x) = [U_s'(x_s), s \in S]$.

To find the system optimal rates and flows we need to consider the following optimization problem.

SYSTEM (U, H, A, C):

$$\text{maximize} \quad \sum_{s\in S} U_s(x_s) \tag{1}$$

$$\text{subject to} \quad Hy = x, \; Ay \leq C \tag{2}$$

$$\text{over} \quad x, y \geq 0 \tag{3}$$

The objective function (1) is differentiable and strictly concave and the feasible region (2),(3) is compact; hence a maximizing value of (x, y) exists and can be found by Lagrangian methods. There is a unique optimum for the rate vector x, since the objective function (1) is a strictly concave function of x, but there may be many corresponding values of the flow rate y satisfying the relations (2) and (3). Say that x *solves SYSTEM* (U, H, A, C) if there exists y such that (x, y) solves the optimization problem (1)–(3).

Consider the Lagrangian form

$$\begin{aligned} L(x,y,z;\lambda,\mu) &= \sum_{s\in S} U_s(x_s) - \lambda^T(x - Hy) + \\ \mu^T(C - Ay - z) &= \sum_{s\in S}\left[U_s(x_s) - \lambda_s x_s\right] + \\ &\sum_{r\in R} y_r\left[\lambda_{s(r)} - \sum_{j\in r}\mu_j\right] - \sum_{j\in J}\mu_j z_j + \sum_{j\in J}\mu_j C_j \end{aligned}$$

where $\lambda = (\lambda_s, s \in S)$, $\mu = (\mu_j, j \in J)$ are vectors of Lagrange multipliers and $(z_j, j \in J)$ is a vector of slack variables. Then

$$\frac{\partial L}{\partial x_s} = U_s'(x_s) - \lambda_s$$

$$\frac{\partial L}{\partial y_r} = \lambda_{s(r)} - \sum_{j\in r}\mu_j$$

$$\frac{\partial L}{\partial z_j} = -\mu_j$$

Hence, at a maximum of L over the orthant $x, y, z \geq 0$, the following conditions hold:

$$\begin{aligned} \lambda_s &= U_s'(x_s) && \text{if } x_s > 0 \\ &\geq U_s'(x_s) && \text{if } x_s = 0 \end{aligned} \tag{4}$$

$$\begin{aligned} \lambda_{s(r)} &= \sum_{j\in r}\mu_j && \text{if } y_r > 0 \\ &\leq \sum_{j\in r}\mu_j && \text{if } y_r = 0 \end{aligned} \tag{5}$$

$$\begin{aligned} \mu_j &= 0 && \text{if } z_j > 0 \\ &\geq 0 && \text{if } z_j = 0 \end{aligned} \tag{6}$$

From the general theory of constrained convex optimization ([8], chapter 5; [13], chapter 3) it follows that there exists a quadruple (λ, μ, x, y) which satisfies

$$\lambda \geq U'(x) \qquad Hy = x \qquad [\lambda - U'(x)]^T x = 0 \tag{7}$$

$$\mu \geq 0 \qquad Ax \leq C \qquad \mu^T(C - Ax) = 0 \tag{8}$$

$$\lambda^T H \leq \mu^T A \qquad y \geq 0 \qquad (\mu^T A - \lambda^T H)\, y = 0 \tag{9}$$

and that, further, the vector x then solves *SYSTEM* (U, H, A, C).

The Lagrange multipliers λ, μ have several simple interpretations. For example, if route r has positive flow on it, $y_r > 0$, then necessarily $\sum_{j\in r}\mu_j \leq \sum_{j\in r^*}\mu_j$ for any other route r^* which serves the same source-sink. We may view μ_j as the *implied cost* of unit flow through link j. Alternatively μ_j is the *shadow price* of additional capacity at link j.

If user s is charged a price λ_s per unit flow, and is allowed to freely vary the flow x_s, then the utility maximization problem for user s is as follows.

USER$_s$ $(U_s; \lambda_s)$

$$\text{maximize} \quad U_s(x_s) - \lambda_s x_s \tag{10}$$

$$\text{over} \quad x_s \geq 0$$

If the network receives a revenue λ_s per unit flow from user s, and is allowed to freely vary the flows x, then the revenue optimization problem for the network is as follows.

NETWORK $(H, A, C; \lambda)$

$$\text{maximize} \quad \sum_s \lambda_s x_s \tag{11}$$

$$\text{subject to} \quad Hy = x, \; Ay \leq C \tag{12}$$

$$\text{over} \quad x, y \geq 0 \tag{13}$$

Say that x solves *NETWORK* (H, A, C, λ) if there exist y such that (x, y) solves the optimization problem (11)-(13).

Theorem 1 *There exists a price vector* $\lambda = (\lambda_s, s \in S)$

such that the vector $x = (x_s,\ s \in S)$, formed from the unique solution x_s to $USER_s\ (U_s;\ \lambda_s)$ for each $s \in S$, solves $NETWORK\ (H, A, C;\ \lambda)$. The vector x then also solves $SYSTEM\ (U, H, A, C)$.

Proof. First note that $USER_s\ (U_s;\ \lambda_s)$ has a unique solution x_s, by the strict concavity of U_s, and that x_s is determined by $U_s'(x_s) \le \lambda_s$, $x_s \ge 0$ and $[\lambda_s - U_s'(x_s)]\ x_s = 0$. Next observe that the Lagrangian form for the optimization problem (11)-(13) is

$$L(x, y, z; p, q) = \sum_s \lambda_s x_s - p^T(x - Hy) + q^T(C - Ay - z) = \sum_s x_s(\lambda_s - p_s) + \sum_r y_r\left(p_{s(r)} - \sum_{j \in r} q_j\right) - \sum_{j \in J} q_j z_j + \sum_{j \in J} q_j C_j$$

Hence any quadruple (λ, μ, x, y), which satifies conditions (7), (8) and (9), identifies Lagrange multipliers $p = \lambda$, $q = \mu$, which establish that (x, y) solves $NETWORK\ (H, A, C;\ \lambda)$, as well as $SYSTEM\ (U, H, A, C)$.

Conversely, for any solution x to $NETWORK\ (H, A, C;\ \lambda)$ there exist Lagrange multipliers p, q, where if $x_s > 0$ then $p_s = \lambda_s$ and if $x_s = 0$ then $p_s \ge \lambda_s$. Thus if x_s solves $USER_s\ (U_s;\ \lambda_s)$ then it will also solve $USER_s\ (U_s;\ p_s)$, and so we may construct a quadruple satisfying conditions (7), (8) and (9) by replacing λ and μ by p and q respectively. This establishes that x solves $SYSTEM\ (U, H, A, C)$, and hence the final part of the theorem.

3. An example: fairness criteria

Suppose that each source-sink s is served by a single route r, and abbreviate notation by writing $s = r$, rather than $s = \{r\}$; thus $H = I$, the identity matrix. Suppose also that $U_s(x_s) = m_s \log x_s$. (Formally, we define $U_s(\cdot)$ over the range $[0, \infty)$, with $U_s(0) = -\infty$ and $U_s'(0) = \infty$). Then at the optimum x_s is necessarily positive, and conditions (7) and (9) become simply

$$\lambda_s = \frac{m_s}{x_s}, \quad \lambda_s = \sum_{j \in s} \mu_j$$

Thus the optimal rate x_s is

$$x_s = \frac{m_s}{\sum_{j \in s} \mu_j} \tag{14}$$

where $(x_s,\ s \in S)$, $(\mu_j,\ j \in S)$ solve

$$\mu \ge 0 \quad Ax \le C \quad \mu^T(C - Ax) = 0 \tag{15}$$

and relation (14).

Next we investigate the relationship between the solution to relations (14), (15) and concepts of fairness. The most common fairness criterion is that of max-min fairness: a vector of rates $x = (x_s,\ s \in S)$ is *max-min fair* if it is feasible (that is $x \ge 0$ and $Ax \le C$), and if for each $s \in S$, x_s cannot be increased (while maintaining feasibility) without decreasing x_{s^*} for some s^* for which $x_{s^*} \le x_s$ [1]. (The compactness and convexity of the feasible region for x imply that such a vector exists, and is unique.) The max-min fairness criterion gives an absolute priority to the smaller flows, in the sense that if $x_{s^*} < x_s$ then no increase in x_s, no matter how large, can compensate for any decrease in x_{s^*}, no matter how small. An alternative fairness criterion, which favours smaller flows less emphatically, is proportional fairness, defined as follows. A vector of rates $x = (x_s,\ s \in S)$ is *proportionally fair* if it is feasible (that is $x \ge 0$ and $Ax \le C$) and if for any other feasible vector x^*, the aggregate of proportional changes is negative:

$$\sum_{s \in S} \frac{x_s^* - x_s}{x_s} < 0$$

Say that resource j is a *bottleneck* if the solution x to relations (14), (15) has $(Ax)_j = C_j$. If $m_s = 1$ for $s \in S$, and if each flow x_s passes through a single bottleneck, then the solution x is necessarily max-min fair. This conclusion does not, however, apply when flows pass through multiple bottlenecks. To investigate this situation further, consider a small feasible perturbation $(x_s,\ s \in S) \to (x_s + \delta x_s,\ s \in S)$. This increases the objective function (1) provided

$$\sum_s U_s'(x_s) \cdot \delta x_s > 0$$

which condition becomes, with $U_s(x_s) = \log x_s$, the condition

$$\sum_s \frac{\delta x_s}{x_s} > 0$$

From the convexity of the feasible region for x and the strict concavity of the logarithm function, it follows that, when $m_s = 1$ for $s \in S$, the solution x to relations (14), (15) is the unique vector of rates that is proportionally fair.

We note that the definition of proportional fairness directly extends to the case where each source-sink s may be served by multiple routes: the definition of feasibility simply becomes that there exists $y \ge 0$ such that $x = Hy$ and $Ay \le C$. Once again the solution x to $SYSTEM\ (U, H, A, C)$ with $U_s(x_s) = \log x_s$, $s \in S$, is the unique vector of rates that is proportionally fair.

The logarithmic utility function is thus intimately associated with the concept of proportional fairness. Is there a utility function that plays a similar role for the concept of max-min fairness? To explore this question further, let us suppose that any feasible flow satisfies $x_s < 1$. (This assumption loses no generality, since we can clearly rescale capacity units so that $\sum_{j \in J} C_j < 1$). Next, let $U_s(x_s) = U_{(\alpha)}(x_s)$ for $s \in S$, where

$$U_{(\alpha)}(x) = -(-\log x)^\alpha \qquad 0 < x < 1,\ \alpha \ge 1$$

The case $\alpha = 1$ is just the logarithmic utility function associated with a proportionally fair allocation of rates. If $0 < x_{s^*} < x_s < 1$,

$$\frac{U'_{(\alpha)}(x_{s^*})}{U'_{(\alpha)}(x_s)} = \frac{x_s}{x_{s^*}}\left(\frac{\log x_{s^*}}{\log x_s}\right)^{\alpha-1} \to \infty \quad \text{as } \alpha \to \infty$$

Thus the collection of utility functions $U = U_{(\alpha)}$ provides a priority to smaller flows which increases as α increases and becomes absolute as $\alpha \to \infty$. The max-min fair allocation of rates is the limit of the solution to *SYSTEM* $(U_{(\alpha)}, H, A, C)$ as $\alpha \to \infty$.

4. An alternative decomposition

The decomposition described by Theorem 1 uses a vector λ giving prices per unit flow. In this Section we describe an alternative decomposition expressed in terms of prices per unit share. If user s is charged an amount m_s per unit time, and receives in return a flow x_s proportional to m_s, then the utility maximization problem for user s is as follows

USER$_s$ $[U_s; \lambda_s]$

$$\text{maximize} \quad U_s\left(\frac{m_s}{\lambda_s}\right) - m_s \tag{16}$$

$$\text{over} \quad m_s \geq 0 \tag{17}$$

Let $m = (m_s, s \in S)$, and define the following optimization problem.

NETWORK $[H, A, C; m]$

$$\text{maximize} \quad \sum_s m_s \log x_s \tag{18}$$

$$\text{subject to} \quad Hy = x \quad Ay \leq C \tag{19}$$

$$\text{over} \quad x, y \geq 0 \tag{20}$$

Say that x solves *NETWORK* $[H, A, C; m]$ if there exists y such that (x, y) solve the optimization problem (18)-(20).

Theorem 2 *There exist vectors $\lambda = (\lambda_s, s \in S)$, $m = (m_s, s \in S)$ and $x = (x_s, s \in S)$ such that*

i) *m_s solves USER$_s$ $[U_s; \lambda_s]$, for $s \in S$;*
ii) *x solves NETWORK $[H, A, C; m]$;*
iii) *$m_s = \lambda_s x_s$ for $s \in S$.*

The vector x then also solves SYSTEM (U, H, A, C).

Proof. The derivative of the objective function (16) is

$$\frac{\partial}{\partial m_s}\left[U_s\left(\frac{m_s}{\lambda_s}\right) - m_s\right] = \frac{1}{\lambda_s}U'_s\left(\frac{m_s}{\lambda_s}\right) - 1$$

Thus the conditions

$$\begin{aligned} U'_s\left(\frac{m_s}{\lambda_s}\right) &= \lambda_s \text{ if } m_s > 0 \\ &\leq \lambda_s \text{ if } m_s = 0 \end{aligned} \tag{21}$$

identify a solution m_s to *USER*$_s$ $[U_s; \lambda_s]$.

The Lagrangian for the optimization problem (18)-(20) is

$$L(x, y, z; p, q) = \sum_s m_s \log x_s - p^T(x - Hy) +$$

$$q^T(C - Ay - z) = \sum_s (m_s \log x_s - p_s x_s) +$$

$$\sum_r y_r\left(p_{s(r)} - \sum_{j \in r} q_j\right) - \sum_{j \in J} q_j z_j + \sum_{j \in J} q_j C_j$$

Then

$$\frac{\partial L}{\partial x_s} = \frac{m_s}{x_s} - p_s$$

$$\frac{\partial L}{\partial y_r} = p_{s(r)} - \sum_{j \in r} q_j$$

$$\frac{\partial L}{\partial z_j} = -q_j$$

Hence, at a maximum of L over the orthant $x, y, z \geq 0$, the following conditions hold:

$$\frac{m_s}{x_s} = p_s \tag{22}$$

$$\begin{aligned} p_{s(r)} &= \sum_{j \in r} q_j \quad \text{if} \quad y_r > 0 \\ &\leq \sum_{j \in r} q_j \quad \text{if} \quad y_r = 0 \end{aligned} \tag{23}$$

$$\begin{aligned} q_j &= 0 \quad \text{if} \quad z_j > 0 \\ &\geq 0 \quad \text{if} \quad z_j = 0 \end{aligned} \tag{24}$$

But the quadruple (λ, μ, x, y) which satisfies conditions (7), (8) and (9) identifies a solution to (22), (23) and (24), with $p = \lambda$, $q = \mu$, and $m_s = \lambda_s x_s$, $s \in S$. Moreover, this solution satisfies the feasibility constraints (12) and (13), and the relation (21). This establishes the existence of the claimed vectors λ, m and x.

Conversely, for any solution x to *NETWORK* $[H, A, C; m]$ there exist Lagrange multipliers p, q, where if $x_s > 0$ then $m_s = x_s p_s$, and if $x_s = 0$ then $m_s = 0$. Thus if $m_s = \lambda_s x_s$ and m_s solves *USER*$_s$ $[U_s; \lambda_s]$ then m_s will also solve *USER*$_s$ $[U_s; p_s]$, and so we may construct a quadruple satisfying conditions (7), (8) and (9) by replacing λ and μ by p and q respectively. Hence conditions i), ii) and iii) of the Theorem imply that x solves *SYSTEM* (U, H, A, C).

Note that if $m_s = 1$ for $s \in S$ then the solution to *NETWORK* $[H, A, C; m]$ is the proportionally fair allocation

of rates. If m_s, $s \in S$, are all integral then the solution to *NETWORK* [H, A, C; m] may be constructed as follows. For each $s \in S$ replace the single user s by m_s identical sub-users, calculate the proportionally fair allocation over the resulting $\sum_{s \in S} m_s$ rates, and then provide to user s the aggregate rate allocated to its m_s associated sub-users. Then the rates *per unit charge* are proportionally fair.

5. Conclusion

We have shown that if each user is able to choose a charge per unit time that it is prepared to pay, and if the network determines allocated rates so that the rates per unit charge are proportionally fair, then a system optimum is achieved when users' choices of charges and the network's choice of allocated rates are in equilibrium. We have not discussed convergence to equilibrium and an interesting and challenging question concerns whether rate control algorithms such as those described in [2, 3, 4] may be adapted to implement the proportional fairness criterion described in this paper.

A further challenging question concerns how the choice of parameter m_s might be implemented in an ATM network. One possibility would be to use the Minimum Cell Rate of ATM standards [5] to buy a share of spare capacity, as well as to provide a lower bound on the rate. In [6] some of the consequential influences on user behaviour are discussed.

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References

[1] D. Bertsekas, R. Gallager: *Data networks*. Prentice-Hall, 1987.

[2] A. Charny, K. K. Ramakrishnan, A. Lauck: *Time scale analysis and scalability issues for explicit rate allocation in ATM networks*. "IEEE/ACM Transactions on Networking", Vol. 4, 1996, p. 569-581.

[3] C. Courcoubetis, V. A. Siris, G. D. Stamoulis: *Integration of pricing and flow control for Available Bit Rate services in ATM networks*. IEEE Globecom '96, London, 1996.

[4] E. J. Hernandez-Valencia, L. Benmohamed, S. Chong, R. Nagarajan: *Rate control algorithms for the ATM ABR service*. This volum.

[5] ITU Recommendation I371: *Traffic control and congestion control in B-ISDN*. Geneva, Switzerland, 1995.

[6] F. P. Kelly: *Charging and accounting for bursty connections*. In: "Internet Economics", (Ed. L. W. McKnight and J. P. Bailey Eds). MIT Press, 1996.

[7] S. H. Low, P. P. Varaiya: *A new approach to service provisioning in ATM networks*. "IEEE Transactions on Networking", Vol. 1, 1993, p. 547-553.

[8] M. Minoux: *Mathematical programming: theory and algorithms*. Wiley, Chichester, 1986.

[9] J. Murphy, L. Murphy, E. C. Posner: *Distributed pricing for embedded ATM networks*. In: "*The Fundamental Role of Teletraffic in the Evolution of Telecommunications Networks*", (Ed. J. Labetoulle and J. W. Roberts). Elsevier, Amsterdam, 1053-1063, 1994.

[10] J. K. MacKie-Mason, H. R. Varian: *Pricing the Internet*. In: "*Public Access to the Internet*", (Ed. B. Kahin and J. Keller). Prentice-Hall, Englewood Cliffs, New Jersey, 1994.

[11] J. K. MacKie-Mason, H. R. Varian: *Pricing congestible network resources*. "IEEE Journal Selected Areas Communication", Vol. 13, 1995, p. 1141-1149.

[12] S. Shenker: *Fundamental design issues for the future Internet*. "IEEE Journal Selected Areas Communication", Vol. 13, 1995, p. 1176-1188.

[13] P. Whittle: *Optimization under constraints*. Wiley, Chichester, 1971.

The Bargaining Problem

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THE BARGAINING PROBLEM[1]

By John F. Nash, Jr.

A new treatment is presented of a classical economic problem, one which occurs in many forms, as bargaining, bilateral monopoly, etc. It may also be regarded as a nonzero-sum two-person game. In this treatment a few general assumptions are made concerning the behavior of a single individual and of a group of two individuals in certain economic environments. From these, the solution (in the sense of this paper) of the classical problem may be obtained. In the terms of game theory, values are found for the game.

INTRODUCTION

A two-person bargaining situation involves two individuals who have the opportunity to collaborate for mutual benefit in more than one way. In the simpler case, which is the one considered in this paper, no action taken by one of the individuals without the consent of the other can affect the well-being of the other one.

The economic situations of monopoly versus monopsony, of state trading between two nations, and of negotiation between employer and labor union may be regarded as bargaining problems. It is the purpose of this paper to give a theoretical discussion of this problem and to obtain a definite "solution"—making, of course, certain idealizations in order to do so. A "solution" here means a determination of the amount of satisfaction each individual should expect to get from the situation, or, rather, a determination of how much it should be worth to each of these individuals to have this opportunity to bargain.

This is the classical problem of exchange and, more specifically, of bilateral monopoly as treated by Cournot, Bowley, Tintner, Fellner, and others. A different approach is suggested by von Neumann and Morgenstern in *Theory of Games and Economic Behavior*[2] which permits the identification of this typical exchange situation with a nonzero sum two-person game.

In general terms, we idealize the bargaining problem by assuming that the two individuals are highly rational, that each can accurately compare his desires for various things, that they are equal in bargaining skill, and that each has full knowledge of the tastes and preferences of the other.

[1] The author wishes to acknowledge the assistance of Professors von Neumann and Morgenstern who read the original form of the paper and gave helpful advice as to the presentation.

[2] John von Neumann and Oskar Morgenstern, *Theory of Games and Economic Behavior,* Princeton: Princeton University Press, 1944 (Second Edition, 1947), pp. 15–31.

In order to give a theoretical treatment of bargaining situations we abstract from the situation to form a mathematical model in terms of which to develop the theory.

In making our treatment of bargaining we employ a numerical utility, of the type developed in *Theory of Games*, to express the preferences, or tastes, of each individual engaged in bargaining. By this means we bring into the mathematical model the desire of each individual to maximize his gain in bargaining. We shall briefly review this theory in the terminology used in this paper.

UTILITY THEORY OF THE INDIVIDUAL

The concept of an "anticipation" is important in this theory. This concept will be explained partly by illustration. Suppose Mr. Smith knows he will be given a new Buick tomorrow. We may say that he has a Buick anticipation. Similarly, he might have a Cadillac anticipation. If he knew that tomorrow a coin would be tossed to decide whether he would get a Buick or a Cadillac, we should say that he had a $\frac{1}{2}$ Buick, $\frac{1}{2}$ Cadillac anticipation. Thus an anticipation of an individual is a state of expectation which may involve the certainty of some contingencies and various probabilities of other contingencies. As another example, Mr. Smith might know that he will get a Buick tomorrow and think that he has half a chance of getting a Cadillac too. The $\frac{1}{2}$ Buick, $\frac{1}{2}$ Cadillac anticipation mentioned above illustrates the following important property of anticipations: if $0 \leqslant p \leqslant 1$ and A and B represent two anticipations, there is an anticipation, which we represent by $pA + (1 - p) B$, which is a probability combination of the two anticipations where there is a probability p of A and $1 - p$ of B.

By making the following assumptions we are enabled to develop the utility theory of a single individual:

1. An individual offered two possible anticipations can decide which is preferable or that they are equally desirable.

2. The ordering thus produced is transitive; if A is better than B and B is better than C then A is better than C.

3. Any probability combination of equally desirable states is just as desirable as either.

4. If A, B, and C are as in assumption (2), then there is a probability combination of A and C which is just as desirable as C. This amounts to an assumption of continuity.

5. If $0 \leqslant p \leqslant 1$ and A and B are equally desirable, then $pA + (1 - p) C$ and $pB + (1 - p) C$ are equally desirable. Also, if A and B are equally desirable, A may be substituted for B in any desirability ordering relationship satisfied by B.

These assumptions suffice to show the existence of a satisfactory utility function, assigning a real number to each anticipation of an individual. This utility function is not unique, that is, if u is such a function then so also is $au + b$, provided $a > 0$. Letting capital letters represent anticipations and small ones real numbers, such a utility function will satisfy the following properties:

(a) $u(A) > u(B)$ is equivalent to A is more desirable than B, etc.

(b) If $0 \leqslant p \leqslant 1$ then $u[pA + (1 - p) B] = pu(A) + (1 - p) u(B)$. This is the important linearity property of a utility function.

TWO PERSON THEORY

In *Theory of Games and Economic Behavior* a theory of n-person games is developed which includes as a special case the two-person bargaining problem. But the theory there developed makes no attempt to find a value for a given n-person game, that is, to determine what it is worth to each player to have the opportunity to engage in the game. This determination is accomplished only in the case of the two-person zero sum game.

It is our viewpoint that these n-person games should have values; that is, there should be a set of numbers which depend continuously upon the set of quantities comprising the mathematical description of the game and which express the utility to each player of the opportunity to engage in the game.

We may define a two-person anticipation as a combination of two one-person anticipations. Thus we have two individuals, each with a certain expectation of his future environment. We may regard the one-person utility functions as applicable to the two-person anticipations, each giving the result it would give if applied to the corresponding one-person anticipation which is a component of the two-person anticipation. A probability combination of two two-person anticipations is defined by making the corresponding combinations for their components. Thus if $[A, B]$ is a two-person anticipation and $0 \leqslant p \leqslant 1$, then

$$p[A, B] + (1 - p)[C, D]$$

will be defined as

$$[pA + (1 - p)C, pB + (1 - p)D].$$

Clearly the one-person utility functions will have the same linearity property here as in the one-person case. From this point onwards when the term anticipation is used it shall mean two-person anticipation.

In a bargaining situation one anticipation is especially distinguished; this is the anticipation of no cooperation between the bargainers. It is

natural, therefore, to use utility functions for the two individuals which assign the number zero to this anticipation. This still leaves each individual's utility function determined only up to multiplication by a positive real number. Henceforth any utility functions used shall be understood to be so chosen.

We may produce a graphical representation of the situation facing the two by choosing utility functions for them and plotting the utilities of all available anticipations in a plane graph.

It is necessary to introduce assumptions about the nature of the set of points thus obtained. We wish to assume that this set of points is compact and convex, in the mathematical senses. It should be convex since an anticipation which will graph into any point on a straight line segment between two points of the set can always be obtained by the appropriate probability combination of two anticipations which graph into the two points. The condition of compactness implies, for one thing, that the set of points must be bounded, that is, that they can all be inclosed in a sufficiently large square in the plane. It also implies that any continuous function of the utilities assumes a maximum value for the set at some point of the set.

We shall regard two anticipations which have the same utility for any utility function corresponding to either individual as equivalent so that the graph becomes a complete representation of the essential features of the situation. Of course, the graph is only determined up to changes of scale since the utility functions are not completely determined.

Now since our solution should consist of *rational* expectations of gain by the two bargainers, these expectations should be realizable by an appropriate agreement between the two. Hence, there should be an available anticipation which gives each the amount of satisfaction he should expect to get. It is reasonable to assume that the two, being rational, would simply agree to that anticipation, or to an equivalent one. Hence, we may think of one point in the set of the graph as representing the solution, and also representing all anticipations that the two might agree upon as fair bargains. We shall develop the theory by giving conditions which should hold for the relationship between this solution point and the set, and from these deduce a simple condition determining the solution point. We shall consider only those cases in which there is a possibility that both individuals could gain from the situation. (This does not exclude cases where, in the end, only one individual could have benefited because the "fair bargain" might consist of an agreement to use a probability method to decide who is to gain in the end. Any probability combination of available anticipations is an available anticipation.)

Let u_1 and u_2 be utility functions for the two individuals. Let $c(S)$ represent the solution point in a set S which is compact and convex and includes the origin. We assume:

6. If α is a point in S such that there exists another point β in S with the property $u_1(\beta) > u_1(\alpha)$ and $u_2(\beta) > u_2(\alpha)$, then $\alpha \neq c(S)$.

7. If the set T contains the set S and $c(T)$ is in S, then $c(T) = c(S)$.

We say that a set S is symmetric if there exist utility operators u_1 and u_2 such that when (a, b) is contained in S, (b, a) is also contained in S; that is, such that the graph becomes symmetrical with respect to the line $u_1 = u_2$.

8. If S is symmetric and u_1 and u_2 display this, then $c(S)$ is a point of the form (a, a), that is, a point on the line $u_1 = u_2$.

The first assumption above expresses the idea that each individual wishes to maximize the utility to himself of the ultimate bargain. The third expresses equality of bargaining skill. The second is more complicated. The following interpretation may help to show the naturalness of this assumption: If two rational individuals would agree that $c(T)$ would be a fair bargain if T were the set of possible bargains, then they should be willing to make an agreement, of lesser restrictiveness, not to attempt to arrive at any bargains represented by points outside of the set S if S contained $c(T)$. If S were contained in T this would reduce their situation to one with S as the set of possibilities. Hence $c(S)$ should equal $c(T)$.

We now show that these conditions require that the solution be the point of the set in the first quadrant where $u_1 u_2$ is maximized. We know some such point exists from the compactness. Convexity makes it unique.

Let us now choose the utility functions so that the above-mentioned point is transformed into the point $(1, 1)$. Since this involves the multiplication of the utilities by constants, $(1, 1)$ will now be the point of maximum $u_1 u_2$. For no points of the set will $u_1 + u_2 > 2$, now, since if there were a point of the set with $u_1 + u_2 > 2$ at some point on the line segment between $(1, 1)$ and that point, there would be a value of $u_1 u_2$ greater than one (see Figure 1).

We may now construct a square in the region $u_1 + u_2 \leqslant 2$ which is symmetrical in the line $u_1 = u_2$, which has one side on the line $u_1 + u_2 = 2$, and which completely encloses the set of alternatives. Considering the square region formed as the set of alternatives, instead of the older set, it is clear that $(1, 1)$ is the only point satisfying assumptions (6) and (8). Now using assumption (7) we may conclude that $(1, 1)$ must also be the solution point when our original (transformed) set is the set of alternatives. This establishes the assertion.

We shall now give a few examples of the application of this theory.

EXAMPLES

Let us suppose that two intelligent individuals, Bill and Jack, are in a position where they may barter goods but have no money with which

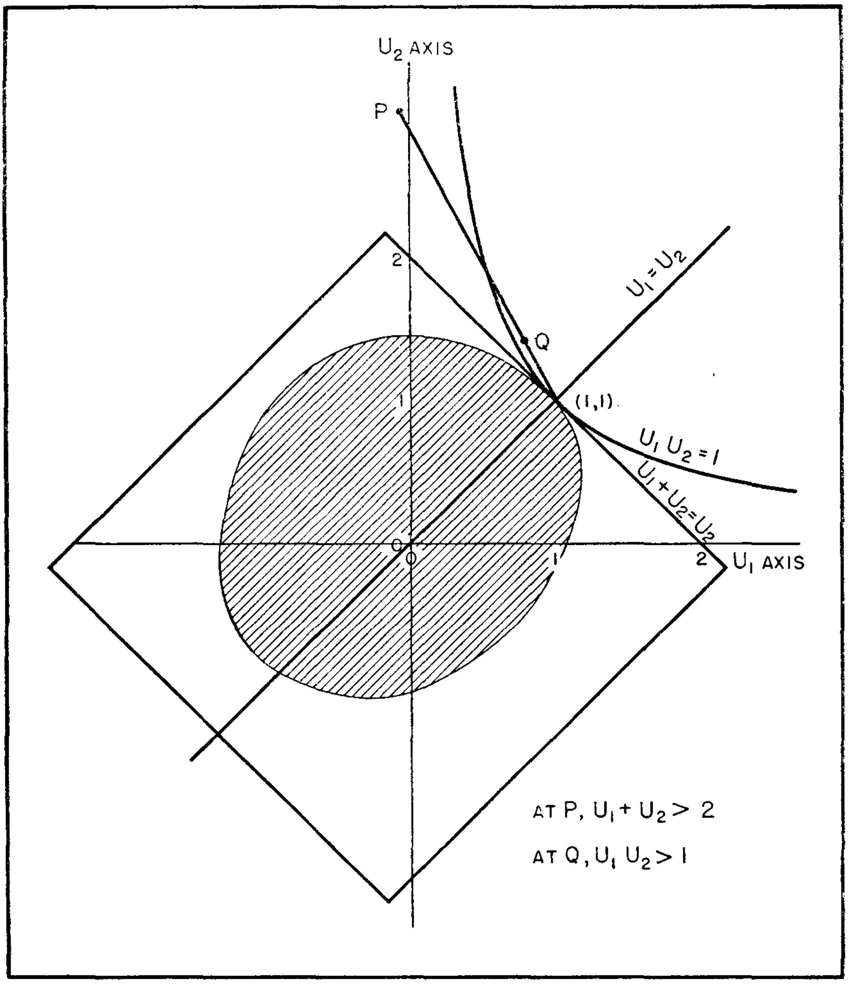

FIGURE 1

to facilitate exchange. Further, let us assume for simplicity that the utility to either individual of a portion of the total number of goods involved is the sum of the utilities to him of the individual goods in that portion. We give below a table of goods possessed by each individual with the utility of each to each individual. The utility functions used for the two individuals are, of course, to be regarded as arbitrary.

Bill's goods	*Utility to Bill*	*Utility to Jack*
book	2	4
whip	2	2
ball	2	1
bat	2	2
box	4	1
Jack's goods		
pen	10	1
toy	4	1
knife	6	2
hat	2	2

The graph for this bargaining situation is included as an illustration (Figure 2). It turns out to be a convex polygon in which the point where the product of the utility gains is maximized is at a vertex and where there is but one corresponding anticipation. This is:

Bill gives Jack: book, whip, ball, and bat,
Jack gives Bill: pen, toy, and knife.

When the bargainers have a common medium of exchange the problem may take on an especially simple form. In many cases the money equiva-

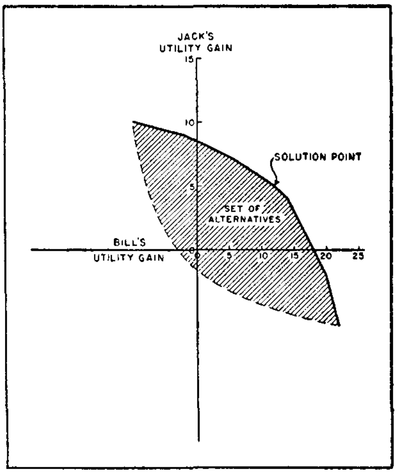

FIGURE 2

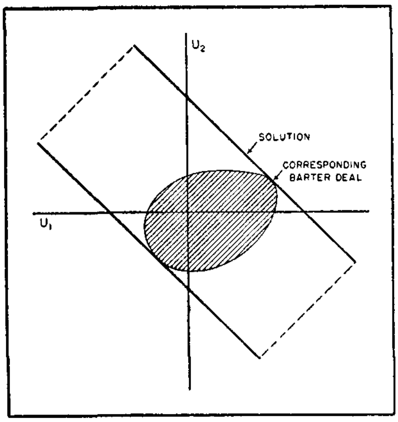

FIGURE 3

FIGURE 2—The solution point is on a rectangular hyperbola lying in the first quadrant and touching the set of alternatives at but one point.

FIGURE 3—The inner area represents the bargains possible without the use of money. The area between parallel lines represents the possibilities allowing the use of money. Utility and gain measured by money are here equated for small amounts of money. The solution must be formed using a barter-type bargain for which $u_1 + u_2$ is at a maximum and using also an exchange of money.

lent of a good will serve as a satisfactory approximate utility function. (By the money equivalent is meant the amount of money which is just as desirable as the good to the individual with whom we are concerned.) This occurs when the utility of an amount of money is approximately a linear function of the amount in the range of amounts concerned in the situation. When we may use a common medium of exchange for the utility function for each individual the set of points in the graph is such that that portion of it in the first quadrant forms an isosceles right triangle. Hence the solution has each bargainer getting the same money profit (see Figure 3).

Princeton University

To: Eli Jacobi[eli.jacobi@amdocs.com]
From: Tal Givoly
Sent: Mon 1/11/2010 12:24:34 PM
Importance: Normal
Subject: RE: Amdocs granted a broad patent in Mediation after winning it over from Nortel

WOWWWWWW!!!!! Let's work on this next week. This patent is really extraordinary and we need to treat it as such.

Tal

From: Eli Jacobi
Sent: Monday, January 11, 2010 10:28 AM
To: Tal Givoly
Subject: Amdocs granted a broad patent in Mediation after winning it over from Nortel

Tal – please approve distribution of this email

Thanks,

n Eli

We are pleased to inform that we received notice that Amdocs has been granted an additional US patent # 7,631,065 titled "System, method and computer program product for merging data in a network-based filtering and aggregating platform" (click link for full patent text). This patent is a very broad patent in the area generic network event processing, accounting, charging, mediation, and billing (and was initially applied to by XACCT). Inventors are Limor Schweitzer, Eran Wagner and Tal Givoly Below is the abstract of the patent, a sample claim, its translation to plain English and the significance to Amdocs.

This patent involved a struggle with Nortel who filed it first and after proving our ownership of the invention, the US Patent Office granted it to Amdocs.

In Plain English

To: Yael Shaham[yael.shaham@amdocs.com]
Cc: Chen Arnon[chen.arnon1@amdocs.com]; Eli Jacobi[eli.jacobi@amdocs.com]
From: Tal Givoly
Sent: Tue 1/19/2010 10:01:52 AM
Importance: Normal
Subject: RE: Amdocs won, and now was GRANTED, a seminal patent 7,631,065

I suggest you do it without me as I'll be traveling for the next few weeks.

Tal

From: Yael Shaham
Sent: Tuesday, January 19, 2010 4:51 PM
To: Chen Arnon
Cc: Tal Givoly; Eli Jacobi; Amy Valadarsky; Zur Yahalom; Roy Mor
Subject: RE: Amdocs won, and now was GRANTED, a seminal patent 7,631,065

Thanks Eli.

Chen – please set meeting with Amy, Roy, Zur, Eli and Tal about this patent and our next steps

Yael Shaham

Revenue Management PBU

AMDOCS > CUSTOMER EXPERIENCE SYSTEMS INNOVATION

Did you know…?

As the industry's first customer experience system, Amdocs CES 7.5 helps service providers differentiate brand, accelerate growth, integrate effectively and assure success so they can transform with lower risk.

From: Eli Jacobi
Sent: Tuesday, January 19, 2010 1:35 PM
To: Yael Shaham
Cc: Tal Givoly
Subject: FW: Amdocs won, and now was GRANTED, a seminal patent 7,631,065

Hi Yael,

Following the granting of US patent 7,631,065 – we believe that it can be used as a business tool to improve our competitive position vs. the competition (Digital Route, Openet) – please see below.

Please take a moment to think about it and suggest what is the best course of action (should I/you call a meeting with Ben/Amy/Roy and yourself?)

Thanks,

n Eli

From: Tal Givoly
Sent: Tuesday, January 19, 2010 10:42
To: Dov Baharav; Ayal Shiran; Shalom Passy; Zvika Naggan; Tamar Rapaport Dagim; Naama Maidan Gilead; Yona Ovadia; Michael Bricker; Jim Liang; Brian Shepherd; Wai Wong; *PBLT *Internet*; *Advanced Technologies - All; Zvi Joseph; Michal Badhav
Cc: Eli Jacobi
Subject: Amdocs won, and now was GRANTED, a seminal patent 7,631,065

Hi,

It gives me great pleasure to update you that just about 4 years after we were notified by the US patent office of winning an interference case against Nortel patent, we were finally awarded the patent and it was granted. US Patent # 7,631,065 is, perhaps, one of the strongest and broadest patents about mediation and event processing on record.

For those unaware, an interference, is a case where a patent issued by another party is "interfered with" by another. We (XACCT, at the time) saw a patent issued by Nortel based on XACCT inventions. We filed an interference with the US patent office, and several years later (back in December of 2005) won the interference. After thoroughly reviewing the case (for the last 4 years), we were now granted the broad patent. The first independent patent claim is:

A computer program product embodied on a computer readable storage medium for processing network accounting information comprising: computer code for receiving from a first source a first network accounting record; computer code for correlating the first network accounting record with accounting information available from a second source; and computer code for using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.

Or, in plain English, the act of correlating network accounting data that comes from one source with accounting information that comes from another source and enhancing it as a result, which is a basic mediation technique, as well as basic technique in many forms of event processing, is now IP owned by Amdocs.

See attached the original note we sent about winning the interference back in December of 2005 as well as the full patent text.

Note: Please do not make public any of this information without approval from Eli Jacobi.

Tal

Tal Givoly
Chief Scientist

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AMDOCS > CUSTOMER EXPERIENCE SYSTEMS INNOVATION

IN THE UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF VIRGINIA
Alexandria Division

AMDOCS (Israel) Limited Plaintiff, v. OPENET TELECOM, LIMITED, et al. Defendants.	)	1:10cv910 (LMB/TRJ)

ORDER

For the reasons to be explained in detail in a Memorandum Opinion to be issued in the near future, plaintiff Amdocs (Israel) Limited's Motion for Proposed Claim Constructions and Partial Summary Judgment of No Invalidity and No Inequitable Conduct [Dkt. No. 98] is GRANTED in part to the extent that the construction of certain claims will be made by the Court and GRANTED as to inequitable conduct but DENIED in all other respects because there are material issues of fact in dispute as to the validity of the '065, '510, and '984 patents.

The same Memorandum Opinion will provide the reasons why Openet's Proposed Claim Construction and Motion for Summary Judgment of Non-Infringement and Invalidity [Dkt. No. 95] is GRANTED in part to the extent that the construction of certain claims in the patents at issue will be made by the Court and GRANTED as to non-infringement, but DENIED as to invalidity of

of the '065 patent because there are material issues of fact in dispute as to that issue.

This ruling will leave only the issue of patent invalidity for trial. Accordingly, it is hereby

ORDERED that within fourteen (14) days of receipt of the Memorandum Opinion, the parties meet and confer about whether they want to take the invalidity claims to trial and advise the Court of their decision within that time period.

Because the Court's Markman constructions of various claim terms do not always adopt either of the party's proposed constructions and neither infringement nor inequitable conduct will be an issue at trial, all the pending motions in limine and motions related to the conduct of the trial, docketed as numbers 117, 121, 124, 126, 130, 132, 143, 145, 147, 151, and 232 are DENIED as moot; however, the parties will be allowed to file new or revised versions of these motions if the remaining patent invalidity issues go to trial and the motions remain relevant to those issues.

Given the proprietary nature of materials in the parties motions and their attached exhibits, sealing motions docketed as numbers 105, 138, and 221 are GRANTED, as is the motion docketed as number 212, which requests leave to correct certain document entries.

Openet's Motion to Strike Exhibits 8-10 [Dkt. No. 164] is GRANTED because this Court does not rely on unsworn statements of witnesses and it is too late to correct that defect.

The Clerk is directed not to enter judgment under Fed, R, Civ. P. 58 until the Memorandum Opinion issues and the Court authorizes entry of a final judgment and to forward copies of this Order to counsel of record.

The Clerk is directed to forward copies of this Order to counsel of record.

Entered this 27th day of September, 2012.

Alexandria, Virginia

/s/ LMB
Leonie M. Brinkema
United States District Judge

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

AMDOCS (ISRAEL) LIMITED, an Israeli Corporation, Plaintiff, v. OPENET TELECOM, INC., a Delaware Corporation, and OPENET TELECOM LTD., an Irish Corporation, Defendants.	Case No. 1:10-CV-910 (LMB/TRJ) **JURY TRIAL DEMANDED**

MEMORANDUM IN SUPPORT OF OPENET'S PROPOSED CLAIM CONSTRUCTIONS AND MOTION FOR SUMMARY JUDGMENT OF NON-INFRINGEMENT AND INVALIDITY

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FEDERAL STATUTES

MISCELLANEOUS

I. INTRODUCTION

Summary judgment should be granted because Amdocs has no evidence of infringement and because the four patents-in-suit are invalid.[1] Despite having full access to Openet's source code, reviewing over one million pages of production documents, and deposing a dozen witnesses, Amdocs has no evidence that the software sold by Openet in the United States:

- Includes a graphic user interface that allows the user to select a function to be applied to specific data fields within a record, as required by the '797 patent.
- Generates a single record representing each of the plurality of services, as required by the '797 patent.
- Includes the additional software code needed to generate the reports on the collection of network usage information claimed by the '984 and '510 patents.
- Collects network usage information in "real time," as claimed by the '984 and '510 patents and as Amdocs proposes that claim term be construed.
- Includes the additional software required to perform the correlation and enhancement steps claimed by the '065 patent.

Because Amdocs cannot meet its burden of proving infringement, its infringement claims should be dismissed. In addition, summary judgment of invalidity is appropriate because the asserted claims of the '065 patent are anticipated by prior art U.S. Patent No. 5,784,443 and because each patent contains claims that are invalid under 35 U.S.C. §§ 101 and/or 112.

A. Overview of the Parties and Patents-in-Suit

The patents-in-suit relate to telecommunications network data mediation. When a person makes a telephone call, sends a text message, or downloads content to a mobile phone, call detail records ("CDRs") are generated by the network. Mediation software mediates (processes and formats) the CDRs for later use by the network's particular billing system.

---

[1] The four patents-in-suit and asserted claims are U.S. Patent Nos. 6,836,797 ("the '797 patent"), claims 1, 2, 7, 8, and 19; 6,947,984 ("the '984 patent"), claims 1, 2, 6, 8, and 13; 7,412,510 ("the '510 patent"), claims 16, 17, and 19; and 7,631,065 ("the '065 patent"), claims 1, 4, 7, 13, and 17. The patents-in-suit are attached hereto as, respectively, Exhibit A-D.

Openet is a small Irish company with U.S. headquarters in Reston, Virginia. It supplies mediation software to AT&T, Verizon, Sprint, and others under the FusionWorks brand name.[2] Amdocs is a large Israeli company whose main business is its proprietary billing system. Indeed, there are installations where companies use Openet software, with the knowledge and acquiescence of Amdocs, to mediate CDRs for later use in an Amdocs billing system. The patents Amdocs accuses Openet of infringing were acquired by Amdocs in 2004 as part of its acquisition of a near bankrupt company (XACCT Technologies) that was unable to compete in the ultra-competitive mediation software marketplace. Amdocs now offers versions of the XACCT mediation software.

B. Overview of Arguments on Summary Judgment

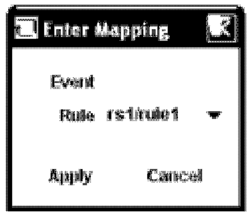
1. The '797 Patent Is Not Infringed for Two Separate Reasons

First, to distinguish the '797 patent over prior art, the patentees claimed a very specific graphic user interface ("GUI") that defined how data fields within a record are modified after the CDRs are collected. The claimed GUI requires three distinct steps: (1) "listing a plurality of available functions to be applied in real-time prior to end-user reporting," (2) "allowing a user to choose at least one of a plurality of fields," and (3) "allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting." Thus, the claimed GUI requires choosing functions to be applied to individual fields within a record. The GUI in FusionWorks, pictured below, only allows the user to apply functions (called "rules" in FusionWorks) to records (called "events").

---

[2] Openet also offers other non-mediation products under the FusionWorks brand name (including FusionWorks Balance Manager, Network Edge Rating, Convergent Charging, and Policy Manager). Amdocs also accuses those products of infringing the '065, '797, and '510 patents on the basis that those products are part of the "FusionWorks Framework," but Amdocs' infringement allegations relate only to mediation. Thus, as used in this brief, "FusionWorks" refers only to FusionWorks Convergent Mediation. Further background information on the accused Openet products is found in the Declaration of Joseph Hogan, filed herewith.

Figure 8-5 Enter Mapping Dialog



FusionWorks lacks the claimed requirements of listing functions, choosing at least one field, and applying at least one listed function to the chosen field, and Amdocs identifies no evidence of such capabilities. Instead, Amdocs alleges infringement on the basis that events are comprised of fields, but that eviscerates the requirement of "allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting" and rewrites the claim as selecting functions to be applied to events rather than to fields. Moreover, Amdocs' technical expert, Dr. Ellen Zegura, admitted "an event is not the same thing as a field." *See* Zegura Dep. at 74:23-25.[3]

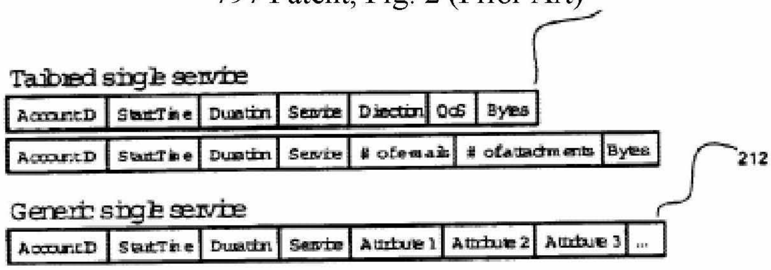
Second, the '797 patent claims "collecting data describing [a] plurality of services" and "generating a single record including the collected data, wherein the *single record represents each of the plurality of services*." '797 patent, claims 1 and 7 (emphasis added).[4] Openet never consolidates CDRs from different services (*e.g.*, email, Internet, text messages) into a single record representing each of the services. Instead, Openet generates one record for each type of service – a practice the '797 patent identifies as prior art. A side-by-side comparison of the prior art method disclosed in the '797 patent practiced by Openet and the claimed single record reflecting each of the plurality of services is below:

---

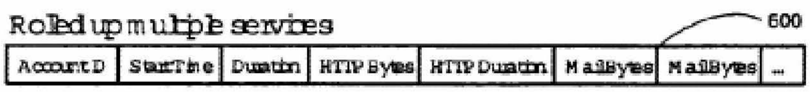
[3] Cited excerpts from the May 6, 2011 deposition of Dr. Zegura are attached hereto as Exhibit E.

[4] Claim 19 similarly claims Claim 19 claims "collecting data with different formats describing a plurality of services" and "describing users of the services" and then "generating a single record including the collected data representing each of the services and the users."

‘797 Patent, Fig. 2 (Prior Art)



‘797 Patent, Fig. 6 (Claimed Invention)



Amdocs again lacks any proof that Openet generates a single record representing each of the plurality of services. In fact, Dr. Zegura has never seen the data records generated by FusionWorks. *See* Zegura Dep. 63:21-64:10, 66:14-67:4. Amdocs alleges that generating a single record from multiple data sources meets this claim limitation, but sources are not services, and moreover, the record generated is at most an aggregation of sources and does not represent <u>each</u> of the plurality of sources or services.

2. <u>The ‘984 and ‘510 Patents Are Not Infringed for Two Separate Reasons</u>

First, the claims of the ‘984 and ‘510 patents require “collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers.” The term “real-time” is a general and amorphous concept, not a specific parameter that defines the metes-and-bounds of the patent claims. The term “real-time” is thus insolubly ambiguous and the ‘984 and ‘510 patents should accordingly be held invalid as indefinite.[5] However, to the extent “real-time” is construed as Amdocs proposes to mean “in a manner which ensures no more than a fixed latency,” the accused products do not infringe this claim limitation.

[5] The claim term “real time” also appears in the ‘797 patent and raises the same indefiniteness issues.

The latency of FusionWorks (the time it takes to process data) is variable and therefore does not collect events in a manner that ensures no more than a fixed latency. Indeed, the collection of CDRs by FusionWorks can fall behind the processing of CDRs and is therefore not in a manner which ensures no more than a fixed latency. Additionally, Amdocs has not identified any FusionWorks performance data or conducted any tests to demonstrate that FusionWorks collects CDRs in a manner which ensures no more than a fixed latency.

Second, the '984 and '510 patents require submitting queries to a database containing network usage information (e.g., CDRs) to "retriev[e] information on the collection of the network usage information from the devices." FusionWorks does not provide the user with the capability to retrieve reports on the collection of the network usage information from the devices. Instead, a user is required to write additional code, called DataStream Decoder (DSD) scripts, to perform reporting on the collection of network usage information.[6] Openet has not provided any of its U.S. customers with such DSD scripts. Not surprisingly, Amdocs identifies no DSD scripts supplied or written by Openet for any U.S. customers for this purpose, and Dr. Zegura did not consider DSD scripts as part of her infringement opinion. *See* Zegura Dep. 18:22-20: 21.

3. The '065 Patent Is Not Infringed and Is Invalid

Amdocs has no proof that FusionWorks infringes the asserted claims of the '065 patent. The '065 patent claims correlating and enhancing data records. FusionWorks requires DSD code to correlate and process data records, but Dr. Zegura admitted she is "not prepared to give an opinion" on whether Openet infringes the '065 patent if DSD code is required to implement those claimed functions. *See* Zegura Dep. 26:6-11.

[6] DSD scripts are also referred to by Openet as DSD codes, rules, business rules, and/or business logic.

Moreover, the '065 patent claims decades old mediation processes, and its claims are anticipated by the '443 patent. Hoping to save the validity of its patent, Amdocs now seeks claim constructions that improperly limit the '065 claims to "IP and/or packet-based networks," but even with Amdocs' proposed claim restrictions, the '443 patent discloses each limitation of each asserted claim of the '065 patent.

II. CLAIM CONSTRUCTION ISSUES

Patent validity and infringement are both two-step analyses. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995); *Power Mosfet Techs., L.L.C. v. Siemens AG*, 378 F.3d 1396, 1406 (Fed. Cir. 2004). In both inquiries, the first step is to determine the meaning and scope of the asserted claims. *Id.* During this step the court may find that a claim term fails to comply with the written description or definiteness requirements of 35 U.S.C. § 112 and hold the patent invalid without proceeding to the second step.[7] The second step is the same whether conducting an anticipation (invalidity) or infringement inquiry. When considering invalidity, the construed terms are compared to the prior art, and when considering infringement, the construed terms are compared to the accused device. *Markman*, 52 F.3d at 976.

A. Disputed Claim Terms

1. Amdocs Seeks to Improperly Limit the Terms "Network Accounting Record," "Network Entity," and "Data Collector" to "IP and/or Packet-Based Networks"

Claim Term	*Openet Proposed Construction*	*Amdocs Proposed Construction*
network accounting record ('065, claims 1, 4, 7)	A record that accounts for network usage	A record reflecting one or more transactions on an IP and/or packet-based network.

[7] To satisfy the written description requirements, "a patent specification must describe an invention and do so in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention." *Regents of the Univ. of Cal. v. Eli Lilly & Co.*, 119 F.3d 1559, 1566 (Fed. Cir. 1997). To satisfy the definiteness requirements, a claim, read in light of the specification, must apprise those skilled in the art of the scope of the claim. *See Miles Labs., Inc. v. Shandon Inc.*, 997 F.2d 870, 875 (Fed. Cir. 1993).

network entity ('065, claim 13)	Device or software in a network from which data can be collected.	A source of data on an IP and/or packet-based network.
data collector ('065, claims 13 and 17)	Device or software that collects data from network entities	Software and/or hardware for collecting data from entities on an IP and/or packet-based network.

The difference between the parties' constructions is that Amdocs seeks to limit the terms to "IP and/or packet-based network." Amdocs' constructions are wrong for three reasons.

First, the specification of the '065 patent does not limit the network to an IP or packet-based network:

> Although the above description of the system 100 has been IP network focused with Unix or Windows NT systems supporting the elements, other networks (non-IP networks) and computer platforms can be used.

'065 patent, 15:21-27 (emphasis added).

Second, Amdocs' efforts to rewrite its claims to save their validity is wrong as a matter of law. In *Acumed LLC v. Stryker Corp.*, 483 F.3d 800 (Fed. Cir. 2007), the terms "transverse" and "perpendicular" were used throughout the specification, but only "transverse" appeared in the claims. *Id.* at 807. The Federal Circuit rejected a proffered construction that limited "transverse" to "perpendicular: "[t]he patentees knew how to restrict their claim coverage to holes passing through at right angles. They could have used the word 'perpendicular,' as they did in discussing their preferred embodiment. Instead, they chose a different term that implies a broader scope." *Id.* As in *Acumed*, the intrinsic record confirms that the patentee knew how to restrict its claim coverage to "IP and/or packet-based networks" but did not do so. Specifically, the patentee utilized both "IP network[s]" (15:22-23) and "network" (2:25-26) in the '065 specification, but chose to claim only the broader term "network." Amdocs cannot now erase that unambiguous claim drafting choice through claim construction.

Third, Amdocs' effort to exclude a disclosed embodiment from the scope of the claims is presumptively wrong under Federal Circuit law. *E.g.*, *In re Katz Interactive Call Processing Patent Litig.*, --- F.3d ---, 2011 WL 607381, at *14 (Fed. Cir. Feb. 18, 2011) ("there is a strong presumption against a claim construction that excludes a disclosed embodiment"). Here, the patentee specifically emphasized in the specification that certain embodiments utilized non-IP networks. '065 patent, 15:21-24 ("In some embodiments, other platforms are used . . . [O]ther networks (non-IP networks) and computer platforms can be used."). Accordingly, Amdocs' attempts to exclude a disclosed embodiment should be rejected.

In contrast to Amdocs' constructions, Openet's constructions are fully supported by the plain language of the claims and the specification, both which refer broadly to networks.

2. Amdocs Seeks to Improperly Limit "First Source" and "Second Source" to Different Types of Information

Openet Proposed Construction	*Amdocs Proposed Construction*
Two distinct sources of network accounting information	first source: a source of network information second source: a source of network information of a different type than the information from the first source

The claim terms "first source" and "second source" appear in independent claims 1 and 7 of the '065 patent in the context of "receiving from a first source a first network accounting record" and "correlating the first network accounting record with accounting information available from a second source." The claims thus plainly indicate that the first source and second source are two distinct sources.

Amdocs' proposed construction permits the second source to be the same source as the first source but yield "information of a different type." Even if the sources are different, nothing in the patent indicates that the first and second source must produce information of a "different type." While the asserted patents make it clear that the information may be of different types,

there is no support for the idea that this is compulsory. Notably, the Federal Circuit has declined to read limitations into claims in this precise circumstance:

> [American Piledriving] again contends that the court improperly imported a limitation from the preferred embodiment into the claims. This court agrees. The claims recite that "said eccentric weight portion" has "at least one insert-receiving area formed therein." . . . Nothing in the independent claims requires or specifies that the insert-receiving area extend fully through either the eccentric weight or the gear portion. Although the specification states that "[t]he bottom portion of the counterweight is cast having insert receiving areas or bores substantially parallel to the center bore and extending fully through the gear portion and fully through the eccentric weight portion" . . . the intrinsic record is devoid of anything to suggest or indicate that the bore must *always* extend fully through either portion.

Am. Piledriving Equip., Inc. v. Geoquip, Inc., 2011 WL 1045360, at *9 (Fed. Cir. Mar. 21, 2011) (emphasis added). Additionally, Amdocs' construction that the information must be of a different undefined "type" (with no further guidance concerning the meaning of "type") does not provide adequate guidance regarding the meaning of the disputed terms. *Honeywell Int'l, Inc. v. Int't Trade Comm'n*, 341 F.3d 1332, 1341 (Fed. Cir. 2003) ("Competitors trying to practice the invention or to design around it would be unable to discern the bounds of the invention.").

3. "Single Records Represent[ing] Each of the Plurality of Services"

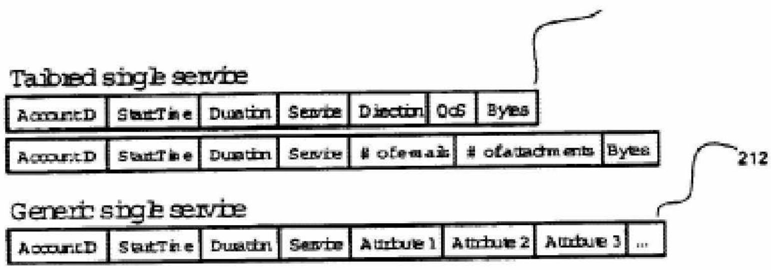
Claim Term	*Openet Proposed Construction*	*Amdocs Proposed Construction*
record	An ordered set of fields representing separate data items.	One or more fields of data treated as a unit and describing one or more transactions.
single record	A rolled up record reflecting all collected data fields	One record.

The term "single record" appears in claims 1, 2, 7, 8, and 19 of the '797 patent. The related term "record" appears in all four patents. Aside from Amdocs' attempt to add the limitation "describing one or more transactions" to the definition of record (and there is no basis to include such language in the definition), there is little difference between the parties' proposed

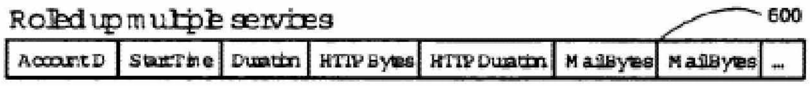
constructions of record. Indeed, both parties seem to agree that records are a collection of data fields. However, as set forth below, the parties' greatly differ in their constructions of single record. Further, the term "single record" lacks adequate written description.

a. Construction of "Single Record"

The ability to collect data and generate a "single record" of all services provided to a customer is essential to the claimed invention of the '797 patent. The '797 patent describes "prior art methods of organizing accounting information" where each service was represented by a "single service data block." '797 Patent, Col. 1:53-65. As depicted in Figure 2 (copied below) of the '797 patent, if two services were used, two records were generated:



The '797 patent taught that "[w]hile these [prior art] methods of accounting for network usage are somewhat effective," generating a different record for each service "failed to allow versatility" in billing systems as the number of services delivered over a network increased, thus there was "a need for a technique of rolling up service accounting information" into a single record. Col. 1:66-2:9. The '797 patent therefore developed a method of "rolling up the services into a single data block" that "may be sent to a Business Support System (BSS) for the purposes of billing at least one recipient of the services." Col. 4:9-14. Instead of generating multiple records for the services consumed by a customer, one rolled-up record reflecting all services consumed by the customer is generated, as depicted in Figure 6 of the '797 patent, copied below:



Accordingly, consistent with the teachings of the '797 patent, single record should be construed to mean a "rolled up record reflecting all collected data fields." Openet's proposed construction is consistent with how single record is used in the asserted claims of the '797 patent. Claims 1 and 7 of the '797 patent claim "collecting data describing [a] plurality of services" and then "generating a single record including the collected data, wherein the single record represents each of the plurality of services." Likewise, Claim 19 claims "collecting data with different formats describing a plurality of services" and "describing users of the services" and then "generating a single record including the collected data representing each of the services and the users." Thus, the asserted claims make clear the single record of the '797 patent reflects all collected data fields.

Amdocs' proposed construction of a "single record" as "one record" is a tautology that ignores the teachings provided in the specification of the '797 patent and the context in which the claim term appears and should be rejected.

b. There Is No Written Description for the Plurality of Services Identified in the Single Record

Apart from the dispute over what the claim term "single record" means, the '797 patent fails to provide adequate written description of the plurality of services from which the single record is created, as required by 35 U.S.C. § 112, ¶ 2. The '797 patent requires that "the single record represents each of the plurality of services; wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP)

session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session." However, there is no disclosure in the '797 patent of instant messaging services.

"[T]he test for sufficiency [of written description] is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (*en banc*). "It is not a question of whether one skilled in the art *might* be able to construct the patentee's device from the teachings of the disclosure, [r]ather, it is a question [of] whether the application necessarily discloses that particular device." *Martin v. Mayer*, 823 F.2d 500, 505 (Fed. Cir. 1987) (emphasis in original, internal citations omitted). In particular, "[t]he written description doctrine prohibits new matter from entering into claim amendments, particularly during the continuation process." *Agilent Techs., Inc. v. Affymetrix, Inc.*, 567 F.3d 1366, 1379 (Fed. Cir. 2009). Thus, written description is "an objective inquiry into the four corners of the specification" to determine whether "the inventor actually invented the invention claimed." *Ariad*, 598 F.3d at 1351

Here, the above listing of the plurality of services was added to all claims of the '797 patent by amendment to overcome prior art. The patentee chose to provide a detailed and exhaustive list of the types of services that the claimed single record reflects. But in so doing, the patentee claimed beyond what was disclosed by the inventors in the specification. Nothing in the four corners of the '797 patent shows that the inventors ever had in their possession the claimed single record reflecting instant messaging services as one of the services; the patent is invalid for failing to comply with the written description requirement.

B. Indefinite Claim Terms

1. "real time" ('797: claims 1, 7, 19; '510: claim 16; '984: claims 1, 13)

Openet Proposed Construction	*Amdocs Proposed Construction*
This claim term is indefinite.	In a manner which ensures no more than a fixed latency.

Real time appears in the '984 and '510 patent in the claim limitation "collecting network communications usage information in real-time from a plurality of network devices" and in the '797 patent in the claim limitation "listing a plurality of functions to be in real-time prior to end user reporting." In each instance, "real time" is indefinite, as it is an amorphous term that does not define the boundaries of the patent claims – a process that is fast enough to be real time to one person skilled in the art may not be real time to another person. Indeed, as Dr. Zegura testified, the meaning of "real time" varies based on the context:

> Q. So if the process had a fixed latency of one day, that would still be real-time?
> A. It depends upon the context.
> Q. So it would change depending on the context?
> A. The context does matter with respect to the fixed latency and that's a component of definition of real-time.

May 6, 2011 Zegura Dep. 84:13-20. *See Geneva Pharms., Inc. v. GlaxoSmithKline*, 349 F.3d 1373, 1384 (Fed. Cir. 2003) (definition that varies by context is "epitome of indefiniteness").

The inventors also could not agree on a single definition of real time. Inventor Tal Givoly testified that "everyone has their own notion of what real-time means." Feb. 11, 2011 Givoly Dep. 481:13-14 (Exh. H). Similarly, inventor Limor Schweitzer testified that "the definition of 'real time' varies widely with the application." Feb. 24, 2011 Schweitzer Dep. 130:19-22 (Exh. I). If the inventors cannot agree on a definition of real time, "[c]ompetitors trying to practice the invention or to design around it would be unable to discern the bounds of the invention." *Honeywell*, 341 F.3d at 1341; *see also Morton Int'l, Inc. v. Cardinal Chem. Co.*, 5 F.3d 1464, 1470 (Fed. Cir. 1993) ("Since the evidence shows that the claims at issue here are

not sufficiently precise to permit a potential competitor to determine whether or not he is infringing, we also agree with the district court's determination that the claims are invalid for failure to satisfy the definiteness requirement of section 112, second paragraph.”).

Amdocs’ proposed construction of “in a manner which ensures no greater than a fixed latency” should be rejected, as it is unsupported by the specification of the patents. The term real time does not appear in the specification of the ‘984 and ‘510 patents. Amdocs’ construction parrots a passage of the ‘797 specification that states “[i]n the context of the present description, a ‘real-time’ environment is that which ensures no more than a fixed latency.” ‘797 Patent, Col. 4:55-56. But this sentence is not purporting to define real time as used in the patent claim and rather refers to “a table [that] may be constructed in the manner shown to present a real-time view of the total resource consumption for all multi-party customers.” *Id.* at 4:51-54.

Further, the above passage was added to the ‘797 specification by a continuation-in-part filed after the November 20, 1997 filing date claimed by Amdocs for the ‘984 and ‘510 patents. Because an equivalent statement is not found in the specification of the ‘984 and ‘510 patents, the term real time still should be held indefinite in the context of those two patents regardless of the Court’s construction of “real time” in the context of the ‘797 patent.

2. “identifying a plurality of services carried out over a network” (‘797: 1, 7)

Openet Proposed Construction	*Amdocs Proposed Construction*
Indefinite. If construed, it refers to analyzing network data records to identify the services associated with each such record.	establishing the identity of more than one service carried out over an IP and/or packet-based network

The claim term “identifying a plurality of services carried out over a network” fails to convey the scope of the patent claim. For example, it is unclear who is required to identify a plurality of services carried out over a network or whether the services must be identified before data is collected. The specification provides no clarity for what actions are required to infringe,

or avoid infringing, this claim. Thus, this claim limitation is invalid as indefinite. But if not indefinite, Openet has proposed a construction that addresses the above issues.

Amdocs' construction fails to provide clarity to this claim term and should be rejected; stating that "identifying" means "establishing the identity" is circular. Additionally, Amdocs again resorts to adding the "over an IP and/or packet-based network" limitation to the claim term; for the reasons discussed above, there is no basis to add this limitation to the claim term.

3. "enhancing" (and variations thereof) ('065: 1, 7; '797: 1, 7, 19)

Openet Proposed Construction	*Amdocs Proposed Construction*
Indefinite. If construed, it refers to field enhancement, as disclosed in the patents.	To add or to modify information in a record.

The claim term "enhancing" (and variations, such as "enhancement procedure") does not have an ordinary and customary meaning to one skilled in the art, and indeed, any processing of data could be characterized as an enhancement. Should the term be construed it should be limited to field enhancement procedures described in the '797 patent, where the user selects specific functions to be applied to specific fields of a record. '797 patent, Col. 12:44-13:47.

Amdocs' proposed construction of adding or modifying data fails to define the scope of this claim, as it risks a finding of infringement under one interpretation and no infringement under another interpretation. *See Honeywell Int'l, Inc. v. ITC*, 341 F.3d 1332, 1340 (Fed. Cir. 2003). For example, it is unclear whether certain additions or modifications of a record are enhancements under Amdocs' construction.

4. "completing" ('510: 16; '984: 1, 13)

Openet Proposed Construction	*Amdocs Proposed Construction*
Indefinite.	Enhancing to generate a complete record.

The claim term "completing" is indefinite because the notion of completing a record is purely subjective, as more information can always be added to a record. Further, Amdocs'

construction of "completing" to mean "enhancing to generate a complete record" is circular, and defining completion in terms of enhancement violates the doctrine of claim differentiation, as enhancement appears in the claims of the related '065 and '797 patents. *See Andersen Corp. v. Fiber Composites, LLC*, 474 F.3d 1361, 1369 (Fed. Cir. 2007) ("different words or phrases used in separate claims are presumed to indicate that the claims have different meanings and scope"); *NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 1293 (Fed. Cir. 2005) (doctrine applies when different patents share common parent application and specification). Enhancing and completing must mean different things, but the patents provide no guidance as to how completing differs from enhancement or when a record is complete.

C. The "Computer Readable [Storage] Medium" Claims Are Not Directed To Patentable Subject Matter and Therefore Are Invalid

Each patent-in-suit includes "computer readable medium" or "computer readable storage medium" claims. Claim 1 of the '065 patent claims "[a] computer program embodied on a computer readable storage medium for processing networking accounting information," Claim 7 of the '797 patent claims "[a] computer program embedded into computer readable medium for generating a single record reflecting multiple services for accounting purposes," and Claim 13 of the '984 patent and Claim 16 of the '510 patent both claim "[a] computer program product embedded into computer readable medium for reporting on the collection of network usage information from a plurality of network devices." These claims embrace non-patentable subject matter and are invalid under 35 U.S.C. § 101 for two reasons.

First, the Patent Office recognized that "the broadest reasonable interpretation of [computer readable media] . . . includes signals *per se*," therefore claims directed to computer readable media "must [be] reject[ed] as covering both non-statutory subject matter and statutory subject matter" unless expressly limited to non-transitory embodiments. *See USPTO Guidelines*

for Subject Matter Eligibility for Computer Readable Media, January 26, 2010 (citing *In re Nuijten*, 500 F.3d 1346, 1356-1357 (Fed. Cir. 2007)). Because the above claims include no such limitations, they are invalid as claiming non-patentable subject matter.

Second, the computer readable media claims are directed to an abstract idea. *See Bilski v. Kappos*, 130 S. Ct. 3218, 3230 (2010). The claims do not "sufficient[ly] tie a process claim to a particular machine." *Cybersource Corp. v. Retail Decisions, Inc.*, 620 F. Supp.2d 1068, 1077 (N.D. Cal. 2009). As a practical matter, network accounting and usage information must be processed on a computer. The claims thus recite "an obvious mechanism for permitting a solution to be achieved more quickly, *i.e*., through the utilization of a computer for performing calculations." *CLS Bank Int'l v. Alice Corp. Pty, Ltd.*, 2011 U.S. Dist. LEXIS 23669, *61 (D.D.C. Mar. 9, 2011). Likewise, the claims recite methods that "[o]n their face . . . simply obtain and compare intangible data" relating to the usage of telecommunications services without ever transforming the data. *Cybersource Corp. v. Retail Decisions, Inc.*, 620 F. Supp. 2d 1068, 1073 (N.D. Cal. 2009); s*ee also Glory Licensing LLC v. Toys 'R' Us, Inc*., No. 09-4252, D.I. 55 at 8 (D.N.J. May 16, 2011) (invalidating patents that "claim processes involving the extraction of information entered into and stored in a document or file and the formatting and transmission of that information to an application program").

III. STATEMENT OF UNDISPUTED FACTS

A. Facts Relevant to Non-Infringement of the '797 Patent

1. Amdocs accuses Openet's FusionWorks products of infringing claims 1, 2, 7, 8, and 19 of U.S. Patent No. 6,836,797 ("the '797 patent").

2. Claim 1 of the '797 patent claims a "method for generating a single record reflecting multiple services for accounting purposes, comprising:

(a) identifying a plurality of services carried out over a network;

(b) collecting data describing the plurality of services; and

(c) generating a single record including the collected data, wherein the single record represents each of the plurality of services; wherein the services include at least two services selected from a group consisting of a hypertext transfer protocol (HTTP) session, an electronic mail session, a multimedia streaming session, a voice over Internet Protocol (IP) session, a data communication session, an instant messaging session, a peer-to-peer network application session, a file transfer protocol (FTP) session, and a telnet session;

wherein the data is collected utilizing an enhancement procedure defined utilizing a graphic user interface by: listing a plurality of available functions to be applied in real-time prior to end-user reporting, allowing a user to choose at least one of a plurality of fields, and allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting."

3. Claim 7 is directed towards "a computer program product" and includes the same limitations as claim 1.

4. Claim 19 claims "a method for generating a single record reflecting multiple services" and includes the limitations of, *inter alia*, "generating a distinct record including the collected data of each of the single records" and "wherein the data is collected utilizing an enhancement procedure defined utilizing a graphic user interface by: listing a plurality of available functions to be applied in real-time prior to end-user reporting, allowing a user to choose at least one of a plurality of fields, and allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting."

5. In FusionWorks, records (including CDRs) are called events. Events are comprised of fields. Declaration of Joseph Hogan ("Hogan Decl."), ¶ 17.

6. An event is different from a field. *See* Zegura Dep. 74:23-25.

7. Records are processed according to functions (called "rules" in FusionWorks). FusionWorks includes a graphic user interface (GUI) that allows the user to select "rules" that are applied to an event when the event is processed. Hogan Decl. ¶ 19.

8. Rules are applied to all fields in an event. The FusionWorks GUI does not allow rules to be applied to a specific field within an event. Hogan Decl. ¶ 20.

9. When events are processed, events of the same service type (*e.g.*, voice, data) can be consolidated into one record. Records reflecting different services can only be aggregated into a file containing multiple records of different service types. Hogan Decl. ¶ 21.

10. Aggregated records are not a single record. *See* Zegura Dep. 94:24-99:23.

B. <u>Facts Relevant to Non-Infringement of the '984 and '510 Patents</u>

1. Amdocs accuses FusionWorks of infringing claims 1, 2, 6, 8, and 13 of U.S. Patent No. 6,947,984 ("the '984 patent") and claims 16, 17, and 19 of U.S. Patent No. 7,412,510 ("the '510 patent").

2. The '984 and '510 patents claim software and methods for "reporting on the collection of network usage information from a plurality of network devices."

3. Each asserted claim of the '984 and '510 patents requires (a) "collecting network communications usage information in real-time from a plurality of network devices,"[8] (b) "filtering and aggregating the network communications usage information," (c) "completing a plurality of data records from the filtered and aggregated network communications usage information," and (d) "storing the plurality of data records in a database."

4. The asserted claims of the '984 patent additionally require (e) "allowing the selection of one of a plurality of reports for reporting purposes," (f) "submitting queries to the database utilizing the selected reports for retrieving information on the collection of network usage information from network device," and (g) "outputting a report based on the queries."

[8] The '984 patent claims additionally specify the network devices from which usage information is collected.

5. The asserted claims of the '510 patent include the additional limitations of "wherein resource consumption queries are submitted to the database utilizing the reports for retrieving information on resource consumption in a network" and "wherein a resource consumption report is output based on the resource consumption queries."

6. FusionWorks includes a "statistics system, which enables statistics definition, delivery, and storage." Hogan Decl. ¶ 23.

7. The statistics system does not natively collect statistics and generate reports; instead additional computer code – written in DataStream Decoder (DSD) format – is required to collect statistics and generate reports. Hogan Decl. ¶ 25.

8. Openet has not provided DSD code to a U.S. customer for purposes of network usage reporting (Hogan Decl. ¶ 26), and Amdocs has not identified any such DSD code.

9. The statistics system does not enable, with or without DSD code, reporting on the collection of network usage information at each network device; instead, the statistics system reports on the internal operation of FusionWorks. *See* Hogan Decl. ¶ 24.

10. FusionWorks does not process events according to a fixed latency. *See* Hogan Decl. ¶ 27. Because system latency varies, FusionWorks does not ensure the collection and processing of events within a fixed latency, and at any given time, the collection of events can exceed the latency of the system. *Id.* at ¶ 28.

C. <u>Facts Relevant to Non-Infringement and Invalidity of the '065 Patent</u>

1. U.S. Patent No. 7,631,065 ("the '065 patent") was filed December 7, 2001 and claims priority to a provisional application filed November 20, 1997. Amdocs alleges a conception date no earlier than July 30, 1997.[9]

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[9] For purposes of this summary judgment motion, Openet uses the earliest priority and conception dates alleged by Amdocs. Openet does not concede that Amdocs is entitled to those dates.

2. Amdocs accuses Openet of infringing claims 1, 4, 7, 13, and 17 of the '065 patent. In its infringement contentions, Amdocs alleges that the Correlation and Transaction Engine (CTE) in the FusionWorks Framework performs the claimed correlation and enhancement steps.

3. The CTE is a rules driven engine. In other words, it requires DSD rules to perform any correlation or processing functions. Hogan Decl. ¶¶ 7-8; *see also* Deposition of Alan McNamee at 75:17-79:7, 95:12-17, 101:22-102:11, 131:20-133:14 (attached as Exhibit F).

4. Amdocs has identified no such DSD rules. In fact, Dr. Zegura admitted that "[she's] not prepared to give an opinion" concerning whether there is infringement if the DSD code is required to perform the functions provided by the CTE. Zegura Dep. 26:6-11

5. Prior art U.S. Patent No. 5,784,443 ("the '443 patent") (Exhibit G) was filed by MCI Corporation on February 1, 1996 and issued July 21, 1998.

6. The '443 patent "relates to systems and methods for creating and maintaining records of customers' use of the resources of a communications network . . . in a fast and versatile manner to provide billing and statistical information." '443 Patent, Col. 1:7-11.

7. The '443 patent discloses "a telecommunications network which provides means to compile and correlate all usage records created by a specific call as it is transmitted through a communications network." Col. 1:54-57.

8. The '443 patent discloses collecting data from multiple sources, including multiple "packet-switched data sources." Col. 3:25-26; *see also* Fig. 3 (identifying three "packet sources"); Fig. 5 (identifying "switch data sources" and "packet-based sources").

9. The '443 patent discloses collecting and processing data from multiple services, *i.e.*, "[t]he communication network . . . may well provide services other than POTS (plain old telephone service)." Col. 3:22-23. *See also* Col. 3:24-26 ("the network may be accessed by

dedicated access terminals, as well as, packet-switched data sources based on other networks").

10. The '443 patent discloses multiple network entities, such as "[s]witches 310 and 312" which receive data from multiple "packet sources." Associated with and coupled to each switch is a collector, or "local record store." "[A]t each site, a record is created of the event and placed in a local record store 321, along with the associated call tag." *See* Col. 2:50-58; Fig. 3 (depicting data sources, network entities, and collectors).

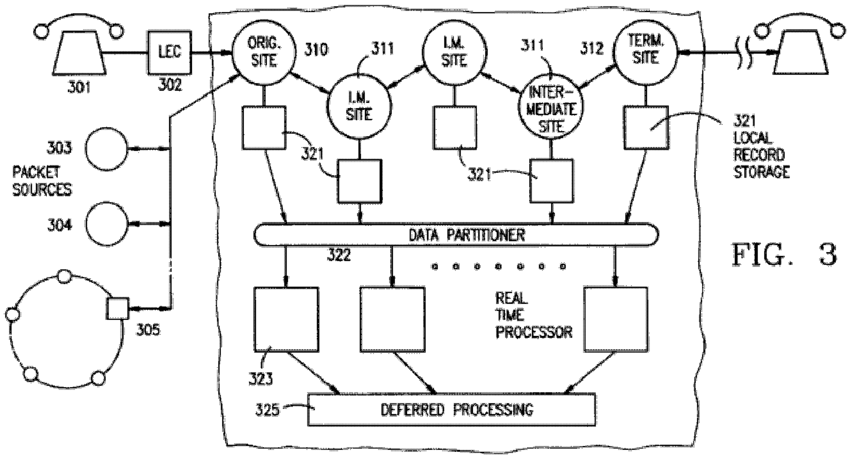
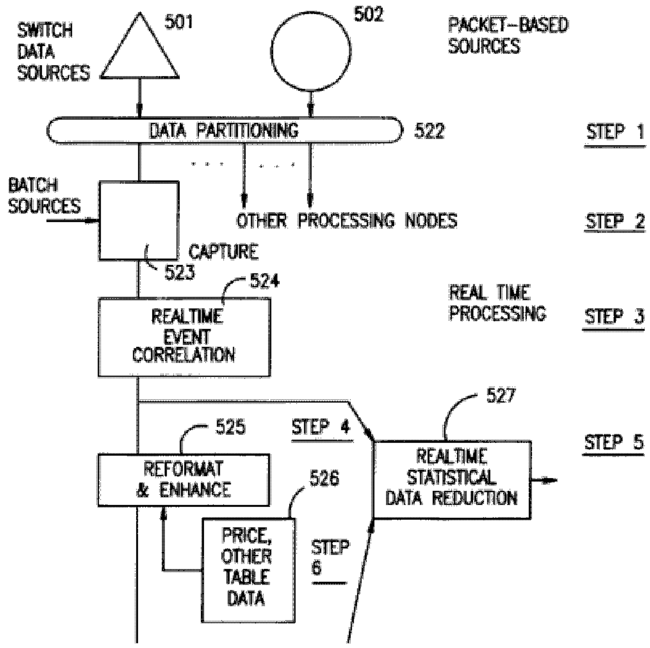


FIG. 3

11. The '443 patent discloses that after the network records have been created and collected, the records are correlated based on information contained in the records: "real-time event correlation stage 524 accepts individual records from capture stage 523 and, based on the associated call tags, combines them into a single record that preferably provides an end-to-end view of the event." Col. 3:56-59.

12. The '443 patent discloses that the correlated records are enhanced in the reformatting and enhancement module; the module "accepts records compiled within real-time correlation stage 524 and creates a standard record of a form used throughout the remainder of system." Col. 3:65-4:1; s*ee also* Fig. 5 ("correlation" and "reformat and enhance" steps).



13. The '443 patent discloses that the records are enhanced or augmented using information from the collected and correlated records. *See* Col. 4:5-7 ("Individual fields from prior records are collected and grouped into physical segments within the standard record."); Col. 4:9-10 ("Fields within the output record are byte-aligned into character and binary numerical fields"). Further, "[a]fter a standard record of an event has been created, it may be augmented with additional information." Col. 4:14-15.

14. The '443 patent discloses processing records based on a policy, such as a time-out period. *See* Col. 3:59-64 ("High-speed matching of records with the same call tag value is carried out until all expected records have been combined, or until a certain time-out period (*e.g.*, 30 minutes) has passed since the last known even record has been created.").

IV. OPENET DOES NOT INFRINGE THE PATENTS-IN-SUIT

A. '797 Patent: The Accused Products Do Not Contain a Graphic User Interface "Allowing the User to Choose At Least One of the Listed Functions To Be Applied to the Chosen Field"

The '797 patent relates to methods and systems for collecting and processing data from a network. Each asserted claim of the '797 patent includes the following specific limitation:

> wherein the data is collected utilizing an enhancement procedure defined utilizing a graphic user interface by: [1] listing a plurality of available functions to be applied in real-time prior to end-user reporting, [2] allowing a user to choose at least one of a plurality of fields, and [3] allowing the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting.

The patentee added this limitation to each claim of the '797 patent to distinguish the patent over prior art. While the '797 patent ultimately issued based on this amendment, these limitations now distinguish the '797 patent over the accused products. FusionWorks does not "allow[ ] a user to choose at least one of a plurality of fields, and allow[ ] the user to choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting." The GUI in FusionWorks only allows the user to choose rules (functions) to be applied to events. No GUI allows the user to choose the fields within an event to which a rule is applied, as required by the claims.

Despite lacking the required specific GUI, Amdocs alleges infringement by arguing that because the user can define the fields in an event, selecting the rules to be applied to an event amounts to selecting rules to be applied to the field. However, the GUI where rules are selected to be applied to events does not allow the selection of fields. Thus, this infringement theory eliminates the requirement that the user "choose at least one of the listed functions to be applied to the chosen field in real-time prior to the end-user reporting." Further, the claims plainly contemplate that all requirements are satisfied by a single GUI.

B. '797 Patent: The Accused Products Do Not Generate a "Single Record Represent[ing] Each of the Plurality of Services" On a Network

FusionWorks does not perform the steps of "collecting data describing [a] a plurality of services" and "generating a single record including the collected data, wherein the single record represents each of the plurality of services," as required by claims 1, 7, and 19 of the '797 patent. Rather than generating a single record representing each of the plurality of services, FusionWorks aggregates data collected from multiple sources.

Amdocs has identified no evidence that the claimed single record is generated at any U.S. installations or that Openet has delivered software capable of generating such a single record. Further, Dr. Zegura has never seen the records output by Openet's software. Zegura Dep. 63:21-67:4. Because Amdocs has no proof of infringement, summary judgment should be entered.

C. '984 and '510 Patents: Openet Does Not "Collect[ ] Network Communications Usage Information In Real-Time From a Plurality of Network Devices At a Plurality of Layers"

Each asserted claim of the '984 and '510 patent requires "collecting network communications usage information in real-time from a plurality of network devices at a plurality of layers." Openet contends "real-time" is insolubly ambiguous and thus the asserted claims are invalid as indefinite. However, if real time is construed as Amdocs proposes to mean "in a manner which ensures no more than a fixed latency," FusionWorks does not infringe.

Because FusionWorks has a variable latency, it does not and cannot ensure events are collected in a manner that ensures no more than a fixed latency. Hogan Decl. ¶ 26. The latency of FusionWorks varies depending on a variety of factors, including the number of events processed and the computing resources available to process incoming events. When the processing of events slows down, system latency increases and the collection of events slows down to the point of not being able to collect and process events as they are received. *Id.* at ¶ 27.

Dr. Zegura admitted that if a system does not guarantee that events are processed as they are received, the system is not "real time" under Amdocs' interpretation of the term:

> Q. Sure. How long of a delay can Openet put into its system to make sure that it is not operating in real-time?
> A. If the operation does not keep up with events as they're being generated in normal circumstances, then that does not constitute real-time.
> Q. In your definition of real-time, what does ensure mean?
> A. Ensure means guaranteeing in normal circumstances.

Zegura Dep. 85:24-86:9. Because the collection and processing of events within a fixed latency is not guaranteed in FusionWorks, the accused products do not collect network usage information in real time as required by the claim under Amdocs construction.

D. <u>'984 and '510 Patents: Openet Does Not Generate Reports "On The Collection of the Network Usage Information from the Network Devices"</u>

Each asserted claim of the '984 and '510 patents requires submitting queries to a database containing network usage information statements for the purpose of "retrieving information on the collection of the network usage information from the devices." Amdocs has identified no evidence that any Openet product sold and delivered in the U.S. meets this claim limitation.

As an initial matter, although FusionWorks contains a rudimentary statistics tool, additional code, written in DataStream Decoder (DSD) format, is required to retrieve information from a statistics library and to generate a report with those statistics. Hogan Decl. ¶ 25. Amdocs has identified no such DSD code written by Openet for any U.S. customer for this purpose, and Dr. Zegura did not consider DSD code in her infringement analysis. Zegura Dep. 18:22-20:10. Accordingly, summary judgment can be entered solely on the basis of Amdocs' failure of proof.

Nonetheless, assuming *arguendo* that such code existed, the FusionWorks statistics system can only generate reports on the operation of FusionWorks itself – for example, the overall number of records processed by the FusionWorks system. Hogan Decl. ¶ 24. Even though FusionWorks can be configured to work with collectors of information from network

devices, FusionWorks lacks the ability to generate the claimed reports "on the collection of the network usage information from the devices." In other words, the FusionWorks statistics system reports on the processing of events within FusionWorks, not on the collection of events from network devices. Indeed, Openet's customers typically use their own software to generate the latter such reports. Hogan Decl. ¶ 26. Because FusionWorks lacks the capability to generate reports on the collection of network usage information from network devices, the accused products do not infringe the '984 and '510 patents.

E. '065 Patent: Amdocs Identifies No Code Performing the Claimed Functions

Amdocs has identified no evidence that Openet has provided software needed to infringe the '065 patent. Claims 1 and 7 of the '065 patent require "correlating [a] first network accounting record with accounting information available from a second source" and "using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record." Likewise, claim 13 requires "an enhancement component that augments data in one of the records . . . with data from a different one of the records."

Amdocs' alleges that the Correlation and Transaction Engine (CTE) in the FusionWorks Framework performs the claimed steps, but Amdocs learned early in the case that the CTE does not itself perform any functions and requires specific DSD code to correlate and process data. Section III.C.3, *supra*. However, Dr. Zegura admitted she was "not prepared to give an opinion" on infringement if DSD code was required. Zegura Dep. 26-6-11. Because Amdocs cannot identify specific DSD code delivered to a specific U.S. customer that actually performs the claimed steps of the '065 patent, summary judgment of non-infringement should be entered.

V. THE '065 PATENT IS ANTICIPATED BY THE PRIOR ART '443 PATENT

1. The '443 Patent Discloses Each Limitation of Each Asserted Claim

35 U.S.C. § 102(e)(2) states that a patent is invalid as anticipated when "the invention was described in . . . a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent." The '443 patent is prior art to the '065 patent, as its filing date (February 1, 1996) predates the '065 patent's alleged invention date (June 30, 1997). As set forth in the following claim charts, the '443 patent anticipates each limitation of each asserted claim of the '065 patent, making summary judgment of invalidity appropriate.[10]

'065 Patent	'443 Patent
1. A computer program product embodied on a computer readable storage medium for processing network accounting information comprising:	"[A] telecommunications network which provides means to compile and correlate all usage records created by a specific call as it is transmitted through a communications network." Col. 1:54-57
computer code for receiving from a first source a first network accounting record;	"At each site, a record is created of the event and placed in a local record store. . . . " Col. 2:56-58.
computer code for correlating the first network accounting record with accounting information available from a second source; and	"[R]eal-time event correlation stage 524 accepts individual records from capture stage 523 and, based on the associated call tags, combines them into a single record that preferably provides an end-to-end view of the event." Col. 3:56-59.
computer code for using the accounting information with which the first network accounting record is correlated to enhance the first network accounting record.	Correlated records are "sent downstream to stage 525" (the "reformat and enhance" stage), which "creates a standard record" by adding or modifying information in one record with information from another record. Col. 3:65-4:1. For example, "[i]ndividual fields from prior records are collected and grouped into physical segments within the standard record"

[10] Because Claims 1 and 7 of the '065 patent contain identical limitations – with claim 1 claiming a "computer program product" and claim 7 claiming an identical "method" – the same analysis applies for both claims and a claim chart is only provide for claim 1. Also, because claim 4 is dependent on claims 2 and 3 (which are not asserted), claim charts are provided for claims 2, 3, and 4.

	and "[f]ields within the output record are byte-aligned into character and binary numerical fields." Col. 4:5-9.
2. The computer program product embodied on a computer readable storage medium of claim 1, wherein the enhancement is based on a policy.	The enhancement occurs "until all expected records have been combined, or until a certain time-out period (*e.g.*, 30 minutes) has passed since the last know even record has been created." Col. 3:59-64. Thus, the policy for enhancing records is that records are processed until all expected records are received or until a time-out period is reached.
3. The computer program product embodied on a computer readable storage medium of claim 2, wherein the accounting information includes parameters and wherein the using comprises adding at least one parameter from the accounting information to the first network accounting record.	The records contain fields (parameters). "Individual fields from prior records are collected and grouped into physical segments within the standard record." Col. 4:5-7. "After a standard record of an event has been created, it may be augmented with additional information." Col. 4:14-15.
4. The computer program product embodied on a computer readable storage medium of claim 3, wherein the accounting information is in the form of a second network accounting record.	Each record is "a record . . . of the event" and is therefore an accounting record. Col. 2:57. Because the information in the enhanced record comes from "prior records," there are multiple records and thus the accounting information is in the form of a second (or third or fourth) network accounting record. Col. 4:5.
13. A system for collecting data from network entities for a data consuming application, comprising:	"[A] telecommunications network which provides means to compile and correlate all usage records created by a specific call as it is transmitted through a communications network." Col. 1:54-57.
a plurality of data collectors to receive information from the network entities and to produce records based on the information, each data collector in the plurality of data collectors being associated with and coupled to a different one of the network entities; and	Multiple "local record storage sites" (collectors) are associated with and coupled to different switches (network entities). "At each site, a record is created of the event and placed in a local record store 321, along with the associated call tag." Col. 3:56-58.

an enhancement component that augments data in one of the records produced by one of the plurality of data collectors with data from a different one of the records produced by another of the plurality of data collectors.	In the "reformat and enhance" module (Fig. 5), "[i]ndividual fields from prior records are collected and grouped into physical segments within the standard record" and "[f]ields within the output record are byte-aligned into character and binary numerical fields." Col. 4:5-9.
17. The system of claim 13, further comprising: a module coupled to the plurality of data collectors, the module receives the records produced by the plurality of data collectors for aggregation purposes, and wherein the enhancement component resides in the module.	The "real time processor" is coupled to the local record storage sites (Fig. 3) and includes "real time event correlation" processes and a "reformat and enhance" accounting records (Fig. 5).

2. <u>The '065 Patent Is Invalid Regardless of Claim Constructions</u>

The '443 patent anticipates the '065 patent regardless of which party's claim constructions are adopted. For example, even if "network accounting record," "network entity," and "data collector" are construed as Amdocs requests to refer only to "IP and/or packet-based networks," the '443 patent collects and processes data from "packet-based sources." Likewise, even if "first source" and "second source" are construed as Amdocs requests to require two different sources, each reflecting different services, the '443 patent collects records from a variety of "packet-based sources" and "switch data sources."

VI. CONCLUSION

For the foregoing reasons, summary judgment of non-infringement and invalidity should be entered.

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CERTIFICATE OF SERVICE

I hereby certify that all counsel of record who have consented to electronic service are being served with a copy of this document via the Court's EM/ECF system on this 26th Day of May 2011, with other counsel of record being served by hand delivery, copy via electronic mail.

/s/ Brian H. Pandya
Brian H. Pandya

CERTIFICATE OF SERVICE

I hereby certify that, on this 6th day of May, 2015 I filed the foregoing Joint Appendix with the Clerk of the United States Court of Appeals for the Federal Circuit via the CM/ECF system, which will send notice of such filing to all registered CM/ECF users.

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